JEE – Main

Chapter wise Model Paper - IV

Time: 3 hrs **Max. Marks: 360**

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IMPORTANT INSTRUCTIONS :

Physics : **Question No. 1 to 30 consists FOUR (4) marks. Negative (-1)**

Chemistry : **Question No. 31 to 60 consists FOUR (4) marks. Negative (-1)**

Maths : **Question No. 61 to 90 consists FOUR (4) marks. Negative (-1)**

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Syllabus:

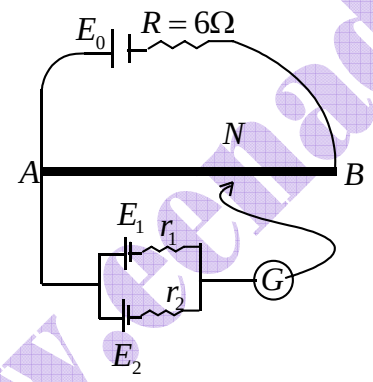
Mathematics : **coordinate geometry**

Physics : **Electricity and magnetism**

Chemistry : **d – Block , f – Block, Coordination compounds, Metallurgy and Principles of Practical Chemistry**

PHYSICS

1 A battery of emf E_0 = 12 V is connected across a 4m long uniform wire having resistance $4\Omega/m$. The cells of small emf $E_1 = 2V$ and $E_2 = 4V$ having internal resistance 2Ω and 6Ω respectively, are connected as shown in figure if galvanometer shows no deflection at the point N, the distance of point N from the point A is equal to



1. 1/6 cm **2.** 80 cm **3.** 125 cm **4.** 250 cm

2 Five balls numbered 1, 2, 3, 4, 5 are suspended using separate threads. The balls (1, 2), (2, 4) and (4, 1) show electrostatic attraction, while balls (2, 3) and (4, 5) show repulsion. Therefore, ball 1 must be

1. negatively charged **2.** positively charge

3. Neutral **4.** made of metals

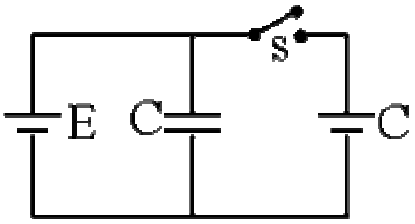
3 A conductor AB of length L moves in XY plane with velocity $\vec{V} = V_0(\hat{i} - \hat{j})$. A magnetic $\vec{B} = B_0(\hat{i} + \hat{j})$ exists in the region. The induced emf is.

1. $\sqrt{2}B_0LV_0$ **2.** $2B_0LV_0$ **3.** B_0LV_0 **4.** Zero

4 A rigid circular loop of radius 'r' and mass 'm' lies in the x-y plane on a flat table and has a current 'i' flowing in it. At this particular place the earth's magnetic field is $\vec{B} = B_x\vec{i} + B_z\vec{k}$. The value of i so that the loop starts tilting is.

1. $\frac{mg}{\pi\sqrt{B_x^2 + B_z^2}}$ **2.** $\frac{mg}{\pi r B_x}$ **3.** $\frac{mg}{\pi r B_z}$ **4.** $\frac{mg}{\pi\sqrt{B_x B_z}}$

5 Fig. shows two identical parallel plate capacitors connected to a battery. The switch is now opened and the free space between the plates of capacitors is filled with a dielectric of K = 3. The ratio of the total electrostatic energy stored both the capacitors before and after the introduction of the dielectric is



1. 3/4 **2.** 4/5 **3.** 2/3 **4.** 3/5

6 A small charged sphere of mass m is suspended with a string in a uniform field $E = (A\hat{i} + B\hat{j})N/C$ Where A and B are positive constants. The sphere is in equilibrium at an angle θ. Then the charge on the ball is.

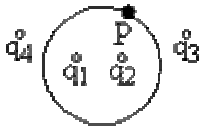
1. $\frac{mg\sin\theta}{A + B\sin\theta}$ **2.** $\frac{mg\cos\theta}{A + B\cos\theta}$

3. $\frac{mg\tan\theta}{A + B\tan\theta}$ **4.** $\frac{mgA}{ma + B\tan\theta}$

7 When a 12Ω resistor is connected with a moving coil galvanometer then its deflection reduces from 50 divisions to 10 divisions. The resistance of the galvanometer is

1. 24Ω **2.** 36Ω **3.** 48Ω **4.** 60Ω

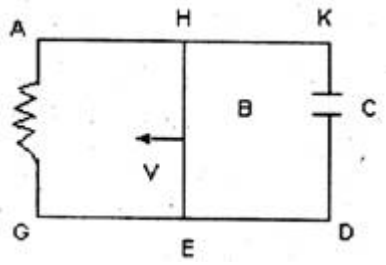
8 Consider the Gaussian surface that surface that surrounds part of the charge distribution shown in Fig. Then, the contribution to the electric field at point P arises from charges



1. q_1 and q_2 only **2.** q_3 and q_4 only

3. q_1, q_2, q_3 and q_4 **4.** None of the above

9 In the circuit shown in the figure, a conducting wire HE is moved with a constant speed v towards left. The complete circuit is placed in a uniform magnetic field B perpendicular into the plane of the circuit. The currents in HKDE and HAGE are.



1. clockwise, clockwise **2.** zero, anticlockwise

3. anticlockwise, anticlockwise **4.** zero, clockwise

10 A solid conducting sphere of radius 10 cm is enclosed by a thin metallic shell of radius 20 cm. A charge $q = 20\mu C$ is given to the inner sphere. Find the heat generated in the process when the inner sphere is connected to the shell by a conducting wire.

1. 12 J **2.** 9 J **3.** 24 J **4.** zero

11 A magnet of magnetic moment $50\hat{i}\ Am^2$ is placed along the x-axis in a magnetic field $\vec{B} = (0.5\hat{i} + 3.0\hat{j})T$. The torque acting on the magnet is :

1. $175\hat{k}\ Nm$ **2.** $150\hat{k}\ Nm$ **3.** $75\hat{i}\ Nm$ **4.** $25\sqrt{37}\,\hat{k}\ Nm$

12 A metal rod moves at a constant velocity in a direction perpendicular to its length. A constant, uniform magnetic field exists in space in a direction perpendicular to the rod as well as its velocity. Select the correct statement from the following :

1. The entire rod is at the same potential

2. There is an electric field in the rod

3. The electric potential is highest at the centre of the rod and decreases towards its ends

4. The electric potential is lowest at the centre of the rod and decreases towards its ends

13 In an induction coil the coefficient of mutual inductance is 5 H. If a current of 4 A in the primary coil is cut off in (1/1500)s the emf at the terminals of the secondary coil will be :

1. 15 kV **2.** 60 kV **3.** 10 kV **4.** 30 kV

14 The primary winding of a transformer has 500 turns whereas its secondary has 5000 turns. The primary is connected to an ac supply of 20 V 50 Hz. The secondary will have an output of :

1. 200 V, 50 Hz **2.** 2 V, 50 Hz

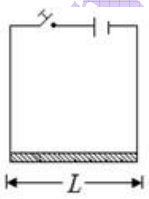
3. 200 V, 500 Hz **4.** 2 V, 5 Hz

15 A conducting circular loop is placed in a uniform magnetic field of induction B teals with its plane normal to the field. Now the radius of the loop starts shrinking at the rate (dr/dt). The induced emf at the instant when the radius is r, is :

1. $\pi rB(dr/dt)$ **2.** $2\pi rB(dr/dt)$

3. $\pi r^2(dB/dt)$ **4.** $(\pi r^2/2)B(dr/dt)$

16 A bar of mass M is suspended by two wires. Assume that a uniform magnetic field B is directed into the page. When the current through the bar is I, then the tension in each supporting wire is



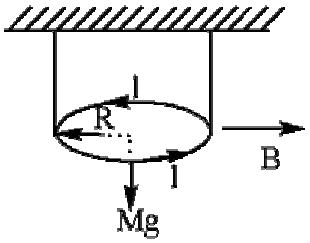
1. $\frac{Mg}{2}$ **2.** 2BIL **3.** Mg-BIL **4.** $\frac{Mg - BIL}{2}$

17 Two electric bulbs rated P_1 watt – V volt and P_2 watt – V volt are connected in parallel and V volt are applied to it. The total power will be

1. $\frac{P_1 P_2}{P_1 + P_2} watt$ **2.** $\sqrt{P_1 P_2}\, watt$

3. $(P_1 + P_2) watt$ **4.** $\frac{P_1 + P_2}{P_1 P_2} watt$

18 A conducting ring of radius 'R' mass 'M' and carrying current I in anticlockwise direction as seen from top hang, with its plane parallel to horizontal plane, by two non-conducting strings as shown in the figure. The uniform horizontal magnetic field B exists is the region. If both strings are tight and the ring is in equilibrium, then the minimum tension in any string will be

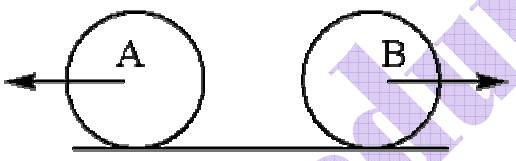


1. $\frac{(2IRB+Mg)}{2}$ **2.** $\frac{Mg}{2}$ **3.** $\frac{(I\pi RB+Mg)}{2}$ **4.** $\frac{(Mg-\pi IRB)}{2}$

19 A magnet is moving towards the coil along the axis and the e.m.f. induced in the coil is ε. If the coil also starts moving towards the magnet with the same speed, the induced e.m.f. will be

1. $\frac{\varepsilon}{2}$ **2.** ε **3.** 2ε **4.** 4ε

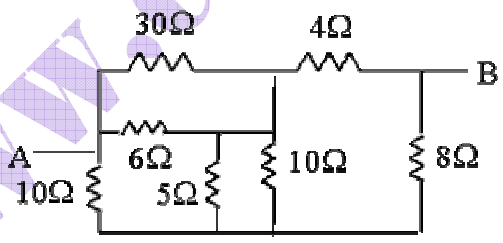
20 Two identical conducting rings A & B of radius R are in pure rolling over a horizontal conducting plane with same speed (of centre of mass) v but in opposite direction. A constant magnetic field B is present pointing inside the plane of paper. Then the potential difference between the highest points of the two rings is.



1. Zero **2.** 2 Bvr

3. 4 Bvr **4.** none of these

21 Find the effective resistance between A and B in the given figure



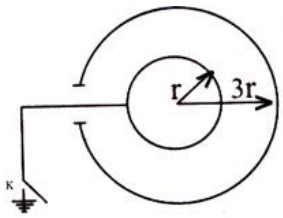
1. 2Ω **2.** 4Ω **3.** 6Ω **4.** 8Ω

22 For thermocouple A and B variation of thermo emf with temperature difference 't' are given as $e_1=(10t-0.04t^2)mV$ and $e_2=(30t-0.02t^2)mV$. Keeping the cold junction at 0^0C, f we want to measure 500^0C, thermocouple to be selected in

1. A **2.** B

3. Both A and B **4.** Neither A Nor B

23 Figure shows two conducting thin concentric shells of radii 'r' and '3r'. The outer shell carries charge 'q' and inner shell is neutral. The amount of charge which flows from inner shell to the earth after the key 'K' is closed, is equal to



1. $\frac{-q}{3}$ **2.** $\frac{q}{3}$ **3.** 3q **4.** –3q

24 The plane of a dip circle is set in the geographical meridian and the apparent dip is θ_1. It is then set in a vertical plane perpendicular to the geographical meridian, the apparent dip becomes θ_2. The angle of declination at the places is given by

1. $\tan\alpha = \sqrt{(\tan\theta_1 + \tan\theta_2)}$ **2.** $\tan\alpha = \tan\theta_1 / \tan\theta_2$

3. $\tan\alpha = (\tan^2\theta_1 / \tan^2\theta_2)$ **4.** $\tan\alpha = \tan\theta_2 / \tan\theta_1$

25 A deflection magnetometer is arranged with its arms along east-west. A small bar magnet is placed length wise with its north pole pointing east along the eastern arm with its centre 25 cm away from the centre of the needle of the magnetometer. The needle is then found to be deflected through an angle of 30^0. f the arms of the magnetometer are rotated anti clockwise through 90^0, the deflection of the needle would be

1. 30^0 **2.** 60^0 **3.** 45^0 **4.** 0^0

26 A vibration magnetometer consists of two identical bar magnets placed one over the other such that they are mutually perpendicular and bisect each other. The time period of oscillation in a horizontal magnetic field is 4s. If one of the magnets is taken away, the time period of oscillation of the other in the same field will be

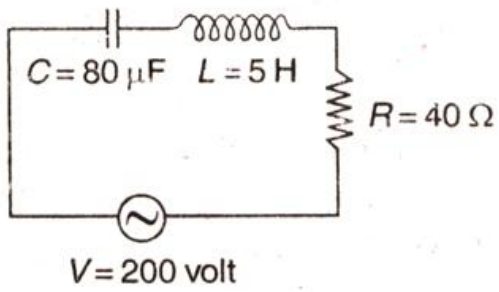
1. $2\sqrt{2}\,s$ **2.** $4\sqrt{2}\,s$ **3.** $4(2)^{1/4}s$ **4.** $4/(2)^{1/4}s$

27 A solid sphere of radius R_1 and volume charge density $\rho = \frac{\rho_0}{r}$ is enclosed by a hollow sphere of radius R_2 with negative surface charge density σ, such that the total charge in the system is zero, ρ_0 is a positive constant and 'r' is the distance from the centre of the sphere. The ratio $\frac{R_2}{R_1}$ is

1. $\frac{\sigma}{\rho_0}$ **2.** $\sqrt{2\sigma/\rho_0}$

3. $\sqrt{\rho_0/(3\sigma)}$ **4.** $\frac{\rho_0}{\sigma}$

28 From figure shown below a series L-C-R circuit connected to a variable frequency 200 V source. L = 5H, C = 80 μF and R = 40Ω. Then the source frequency which drive the circuit at resonance is :

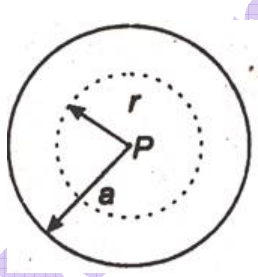


1. 25 Hz **2.** $\frac{25}{\pi} Hz$ **3.** 50 Hz **4.** $\frac{50}{\pi} Hz$

29 A voltage of peak value 283 V and varying frequency is applied to a series L-C-R combination in which R = 3Ω, L = 25 mH and C = 400 μF. The frequency (in Hz) of the source at which maximum power is dissipated in the above, is :

1. 100.2 **2.** 25.3 **3.** 75.4 **4.** 50.3

30 The fig. shows the cross-section of a long cylindrical conductor of radius 'a' carrying a uniformly distributed current 'i'. The magnetic field due to current at P is :



1. $\mu_0 ir/(2\pi a^2)$ **2.** $\mu_0 ir^2(2\pi a)$

3. $\mu_0 ia^2(2\pi r^2)$ **4.** $\mu_0 ia^2(\pi r^2)$

CHEMISTRY

31 The pair of the compounds in which both the metals are in the highest possible oxidation state is

1. $[Fe(CN)_6]^{4-}, [Co(CN)_6]^{3-}$ **2.** CrO_2Cl_2, MnO_4^-

3. TiO_3, MnO_2 **4.** $[Co(CN)_6]^{3-}, MnO_3$

32 The radius of La^{3+} (Atomic number of La = 57) is $1.06\mathring{A}$. Which one of the following given values will be closest to the radius of Lu^{3+} (Atomic number of Lu = 71)?

1. $1.40\mathring{A}$ **2.** $1.06\mathring{A}$ **3.** $0.85\mathring{A}$ **4.** $1.60\mathring{A}$

33 Assertion(A): Complex$[Fe(H_2O)_5NO]SO_4$ is paramagnetic.

Reason (R): The Fe in $[Fe(H_2O)_5NO]SO_4$ has three unpaired electrons

1. If both A and R are correct and R is the correct explanation of the A

2. If both A and R are correct, but R is not the correct explanation of the A

3. If A is correct but R is incorrect

4. If A is incorrect but R is correct

34 Extraction of zinc from zinc blende is achieved by

1. Electrolytic reduction

2. Roasting followed by reduction with carbon

3. Roasting followed by reduction with another metal

4. Roasting followed by self – reduction

35 Ammonium ion is detected using

1. Tollen's reagent **2.** Nessler's reagent **3.** Deverda alloy **4.** Fusion mixture

36 An incorrect matching of the catalyst and process is

1. $TiCl_4$ - Polymerisation of ethane **2.** Cu – Dehydration of ethanol

3. V_2O_5 - Contact process of sulphuric acid **4.** Fe - Ostwald's process of nitric acid

37 Lanthanide for which +2 and +3 oxidation states are common is

1. La **2.** Nd **3.** Ce **4.** Eu

38 Ornamental gold is an alloy of gold with a metal (M) of 3d – series. The number of unpaired electrons and the numbers of d – electrons present in the divalent state of M are respectively

1. 1,9 **2.** 0,10 **3.** 1,10 **4.** 0,9

39 Read the following statements

I: Silver is usually extracted by hydrometallurgy

II: Iron is usually obtained by pyrometallurgy

III: Mercury is obtained by thermal reduction of sulphide

IV: Potassium is obtained by electrolytic reduction of fused chloride

The correct statements are

1. I and II **2.** II and III **3.** I, II and III **4.** I, II, III and IV

40 A salt of divalent zinc gives a white precipitate on treating with caustic soda solution. The precipitate dissolves in excess alkali forming

1. $[Zn(H_2O)_4]^{2+}$ **2.** $[Zn(OH)_4]^{2+}$ **3.** $Zn(OH)_2$ **4.** ZnO

41 A pair of colourless species among TiF_6^{2-}, COF_6^{3-}, $NiCl_4^{2-}$ and Cu_2Cl_2 is

1. TiF_6^{2-}, Cu_2Cl_2 **2.** TiF_6^{2-}, CoF_6^{3-} **3.** $NiCl_4^{2-}, CuCl_2$ **4.** $NiCl_4^{2-}, CoF_6^{3-}$

42 Which of the following is true for the complexes $[Ni(CN)_4]^{2-}$ and $[NiCl_4]^{2-}$

1. They have same shape **2.** They have same primary valency

3. They have same magnetic moment **4.** They have same hybridization

43 Increasing order of the mass percentage of copper in the following alloys

A) Deverda alloy B) Bell metal C) Duralumin D) Aluminium bronze

1. A<B<C<D **2.** D<C<B<A **3.** C<D<A<B **4.** B<A<D<C

44 One of the conformatory tests of nitrates in the qualitative analysis is brown ring test. Freshly prepared ferrous sulphate solution is used to form a brown coloured complex. Effective atomic number of the metal in the complex compound is

1. 25 **2.** 26 **3.** 36 **4.** 37

45 The molar mass of potassium dichromate is X $g\,mol^{-1}$. When hypo is standardized using dichromate, by iodometry, the equivalent weight of $K_2Cr_2O_7$ is

1. $\frac{X}{2}$ **2.** $\frac{X}{3}$ **3.** $\frac{X}{6}$ **4.** $\frac{X}{7}$

46 The ion that has f^7 electronic configuration is

1. $Ce^{3+}(At.No.of\ Ce = 58)$ **2.** $Gd^{3+}(At.No.of\ Gd = 64)$

3. $Sm^{2+}(At.No.of\ Sm = 62)$ **4.** $Yb^{2+}(At.No.of\ Yb = 70)$

47 $[Cr(H_2O)_5Cl]SO_4$ and $[Cr(H_2O)_5SO_4]Cl$ are

1. Ionization isomers **2.** Coordination isomers **3.** Linkage isomers **4.** Hydrate isomers

48 In aluminothermic process, the ratio of moles of ferric oxide and reducing agent used is

1. 3:1 **2.** 1:3 **3.** 2:1 **4.** 1:2

49 Which of the following in aqueous solution exhibits pink colour

1. Cu^{2+} **2.** Fe^{2+} **3.** Ni^{2+} **4.** Mn^{2+}

50 Which of the following is a double salt

A) Potash alum B) Mohr's salt C) Carnallite D) Cuprammonium sulphate

1. B,D **2.** A,C,D **3.** A,B,C **4.** A,B,C,D

51 Consequences of lanthanide contraction are

A) Elements of 4f are difficult to separate

B) Zr and Hf have almost some size

C) Hg has higher ionization energy than Cd

1. A and B only **2.** A and C only **3.** B and C only **4.** A,B and C

52 If the bond length of CO bond in carbon monoxide is $1.128\mathring{A}$, then what is the value of CO bond length in $Fe(CO)_5$?

1. $1.15\mathring{A}$ **2.** $1.128\mathring{A}$ **3.** $1.13\mathring{A}$ **4.** $1.118\mathring{A}$

53 Which one of the following chemical equations is uncommon in the metallurgical processes

1. $Na_2O + C \rightarrow 2Na + CO$ **2.** $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

3. $HgS + O_2 \rightarrow Hg + SO_2$ **4.** $SnO_2 + 2C \rightarrow Sn + 2CO$

54 Which of the following in aqueous solutions exhibits pink color

1. Cu^{2+} **2.** Fe^{2+} **3.** Ni^{2+} **4.** Mn^{2+}

55 Total number of geometrical isomers for the complex

$[RhCl(CO)(PPh_3)(NH_3)]$ is

1. 4 **2.** 3 **3.** 2 **4.** 1

56 Magnetic moment is highest for the following ion of vanadium is

1. VO_2^+ **2.** VO^{3+} **3.** VO^{2+} **4.** VO^+

57 Match the following

Column I	Column II
A. $Pbs \rightarrow PbO$	**P.** Calcinations only
B. $CaCO_3 \rightarrow CaO$	**Q.** Roasting only
C. $ZnS \rightarrow Zn$	**R.** Roasting followed by reduction with coke
D. $Cu_2S \rightarrow Cu$	**S.** Roasting followed by self reduction
	T. Roasting followed by self reduction with CO.

1). A--> Q B--> P C--> R D--> S

2). A--> P B--> S C--> R D--> Q

3). A--> R B--> S C--> P D--> Q

4). A--> P B--> S C--> Q D--> R

Paragraph: When a metal rod M is dipped into an aqueous colourless concentrated solution of compound N, the solution turns light blue. Addition of aqueous $NaCl$ to the blue solution gives a white precipitate O. Addition of aqueous NH_3 dissolves O and given an intense blue solution

58 The metal rod M is

1. Fe **2.** Cu **3.** Ni **4.** Co

59 The compound N is

1. $AgNO_3$ **2.** $Zn(NO_3)_2$ **3.** $Al(NO_3)_3$ **4.** $Pb(NO_3)_2$

60 The final solution contains

1. $\left[Pb\left(NH_3\right)_4\right]^{2+}$ and $\left[\left(COCl_3\right)_4\right]^{2-}$ 2. $\left[Al\left(NH_3\right)_4\right]^{3+}$ and $\left[Cu\left(NH_3\right)_4\right]^{2+}$

3. $\left[Ag\left(NH_3\right)_2\right]^{+}$ and $\left[Cu\left(NH_3\right)_4\right]^{2+}$ 4. $\left[Ag\left(NH_3\right)_2\right]^{+}$ and $\left[Ni\left(NH_3\right)_6\right]^{2+}$

MATHEMATICS

61 Lines $ax+by+c=0$ where $3a+2b+4c=0, a,b,c\in R$ are concurrent at the point

1. $(3,2)$ **2.** $(2,4)$ **3.** $(3,4)$ **4.** $(3/4,1/2)$

62 The number of integer value of $m,$ for which the x-coordinate of the point of intersection of the lines $3x+4y=9$ and $y=mx+1$ is also an integer is

1. 2 **2.** 0 **3.** 4 **4.** 1

63 A variable chord of the circle $x^2+y^2-2ax=0$ is drawn through the origin. Locus of the centre of the circle drawn on this chord as diameter is

1. $x^2+y^2+ax=0$ **2.** $x^2+y^2+ay=0$
3. $x^2+y^2-ax=0$ **4.** $x^2+y^2-ay=0$

64 If the normal chord at a point $'t'$ on the parabola $y^2=4ax$ subtends a right angle at the vertex, then the value of t is

1. 4 **2.** $\sqrt{3}$ **3.** $\sqrt{2}$ **4.** 1

65 The normal at an end of a latus rectum of the ellipse $x^2/a^2+y^2/b^2=1$ passes through an end of the minor axis if

1. $e^4+e^2=1$ **2.** $e^3+e^2=1$ **3.** $e^2+e=1$ **4.** $e^3+e=1$

66 The condition that the equation $lx+my+n=0$ represents the equation of a straight line in the normal form is

1. $l^2+m^2\neq 0; n>0$ **2.** $l^2+m^2\neq 0; n<0$

3. $l^2+m^2=1; n<0$ **4.** $l^2+m^2=1;\ n>0$

67 **In ABC, A= (3, 4), B= (0, 2), C= (6, -3). If *D, E, F* are three points such that each divides $\overline{BC},\overline{CA},\overline{AB}$ in the ratio 3:2 internally then centroid of Δ DEF is**

1. $\left(\frac{7}{2},-\frac{1}{2}\right)$ **2.** $\left(\frac{3}{5},-\frac{4}{5}\right)$ **3.** (3,1) **4.** (2, –3)

68 In the standard ellipse, the lines joining the ends of the minor axis to one focus are at right angles. The distance between the focus and the nearer vertex is $\sqrt{10}-\sqrt{5}$, The equation of the ellipse

1. $\frac{x^2}{36}+\frac{y^2}{18}=1$ **2.** $\frac{x^2}{40}+\frac{y^2}{20}=1$

3. $\frac{x^2}{20}+\frac{y^2}{10}=1$ **4.** $\frac{x^2}{10}+\frac{y^2}{5}=1$

69 **Two tangents are drawn to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ from the point *p*(*h, k*). The points in which these tangents cut the axes are concyclic. The locus of *P* is**

1. $xy=a^2b^2$ **2.** $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$

3. $x^2-y^2=a^2-b^2$ **4.** $x^2+y^2=a^2+b^2$

70 A right angle triangle *ABC* having right angle at '*C*'. *CA*= *a*, *CB* = *b* moves such that the angular points *A* and *B* slide along x–axis and y-axis respectively, then locus of *C* is

1. $ax+by+1=0$ **2.** $ax^2+2bxy+by^2=0$

3. $ax\pm by=0$ **4.** $ax^2-by^2=0$

71 A straight line *L* with negative slope passes through the point (8, 2) and cuts the positive coordinate axes at points *P* and *Q*. As *L* varies, the absolute minimum value of $OP + OQ =$ ____ where *O* is the origin

1. 10 **2.** 18 **3.** 16 **4.** 12

72 Tangents are drawn to the circle $x^2+y^2=1$ at the points where it is met by the circles $x^2+y^2-(\lambda+6)x+(8-2\lambda)y-3=0;\lambda\in R$. The locus of the point of intersection of these tangents is

1. $2x - y + 10 = 0$ **2.** $x + 2y - 10 = 0$

3. $x - 2y + 10 = 0$ **4.** $2x + y - 10 = 0$

73 When the axes are rotated through an angle 15º without changing the origin, the

equation $2x^2+3xy+4y^2-4x+5y+1=0$ changes to $ax^2+2hxy+by^2+2gx+2fy+c=0$ then correct statements among the following is (are)

Statement I : a+b = 6

Statement II: $g^2+f^2=-\frac{23}{4}$

1. Only I
2. only II
3. Both I & II
4. Neither I nor II

74 A ray of light travels along the line $2x-3y+5=0$ and gets reflected d by the line mirror $x+y=2$. The equation of the line containing the reflected ray is

1. $2x-3y+3=0$
2. $3x-2y+3=0$
3. $21x-7y+1=0$
4. $21x+7y-1=0$

75 Two distinct chords of the parabola $y^2=4ax$ passing through $(a, 21)$ are bisected by the line $x+y=1$. The length of the latus rectum of the parabola can be

1. 9
2. 3
3. 4
4. 5

76 The locus of the centres of the circles which touch a given line and passes through a given point (not lying on the given line) is

1. a circle
2. a parabola
3. an ellipse
4. a straight line

77 The condition that the curves $ax^2+2hxy+by^2+2gx+2fy+c=0$ and $Ax^2+2Hxy+By^2+2Gx+2Fy+c=0$ intersect in four concyclic points is

1. $\frac{a-b}{G}=\frac{A-B}{g}$
2. $\frac{a-b}{F}=\frac{A-B}{F}$
3. $\frac{ab}{a-b}=\frac{AB}{A-B}$
4. $\frac{a-b}{h}=\frac{A-B}{H}$

78 The shortest distance between the curves $y^2 = 4ax; x^2 + y^2 - 24ay + 128a^2 = 0$ is

1. $a(\sqrt{5}-1)$ **2.** $2a(\sqrt{5}-1)$

3. $3a(\sqrt{5}-1)$ **4.** $4a(\sqrt{5}-1)$

79 *P(-3, 2)* is one end of focal chord *PQ* of the parabola $y^2 + 4x + 4y = 0$. Then slope of the normal at *Q* is

1. 2 **2.** -2 **3.** $\frac{1}{2}$ **4.** $-\frac{1}{2}$

80 From an arbitrary point p on the circle $x^2 + y^2 = 9$,tangents are drawn to the cirlce $x^2 + y^2 = 1$ which meet $x^2 + y^2 = 9$ at A and B. locus of the point of intersection of tangents at A and B to the circle $x^2 + y^2 = 9$ is

1. $x^2 + y^2 = 81$ **2.** $x^2 + y^2 = \left(\frac{27}{7}\right)^2$

3. $x^2 + y^2 = \left(\frac{7}{27}\right)^2$ **4.** $x^2 + y^2 = 9$

81 *OPQR* is a square and *M* and *N* are the middle points of the sides *PQ* and *QR* respectively then the ratio of the areas of the square and the triangle *OMN* is

1. 4 : 1 **2.** 2 : 1 **3.** 8 : 3 **4.** 4 : 3

82 If $p, x_1, x_2, \ldots$ and $q, y_1, y_2, \ldots$ are in A.P with common difference *a* and *b* respectively, then the centre of mean position of the points $A_i(x_i.y_i)$, $i = 1, 2, 3, \ldots n$ lies on the line

1. $ax - by = aq - bp$ **2.** $bx - ay = ap - bq$

3. $bx - ay = bp - aq$ **4.** $ax - by = bq - ap$

83 Two circles touch each other externally with radii 4 and 9. The area of the quadrilateral formed by the centres and the points of contact of a direct common tangent is

1. 124 **2.** 78 **3.** 30 **4.** 136

84 An equation of a line through the point (1, 2) whose distance from the point (3, 1) has the greatest value is

1. $y = 2x$ **2.** $y = x + 1$

3. $x + 2y - 5 = 0$ **4.** $y = 3x - 1$

85 Tangents are drawn to $x^2 + y^2 - 1 = 0$ from any arbitary point P on the circle $C_1 : x^2 + y^2 - 4 = 0$. These tangent meets the circle "C_1" again in *A* and *B*. Locus of point of intersection of tangents drawn to C_1 at *A* and *B* is

1. $x^2 + y^2 = 10$ **2.** $x^2 + y^2 = 16$

3. $x^2 + y^2 = 5$ **4.** $x^2 + y^2 = 25$

86 In a ΔABC, *B* = (2, 3), C= (7, -1) also *AB*= 3, *AC*= 5 then equation of altitude through *A* is

1. $10x - 8y + 21 = 0$ **2.** $5x + 4y - 21 = 0$

3. $5x - 4y - 21 = 0$ **4.** $10x - 8y = 21$

87 Let *PQ* and *RS* be tangents at the extremities of a diameter *PR* of a circle of radius *r* such that *PS* and *RQ* intersect at a point *X* on the circumference of the circle, then 2*r* equals

1. $\sqrt{PQ.RS}$ **2.** $\frac{PQ + RS}{2}$

3. $\frac{2PQ.RS}{PQ + RS}$ **4.** $\sqrt{\frac{(PQ)^2 + (RS)^2}{2}}$

88 A line bisecting the ordinate *PN* of a point $P\left(at^2, 2at\right), t > 0$ on the parabola $y^2 = 4ax$ is drawn parallel to the axis to meet the curve at *Q*. If *NQ* meets the tangent at the vertex at the point *T*, then the coordinates of *T* are

1. $\left(0, \frac{4}{3}at\right)$ **2.** (0, 2*at*) **3.** $\left(\frac{1}{4}at^2, at\right)$ **4.** (0, *at*)

89 If the tangent at a point $(a\cos\theta, b\sin\theta)$ on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ meets the auxiliary circle in two points, the chord joining them subtends a right angle at the centre then the eccentricity of the ellipse is given by

1. $(1+\cos^2\theta)^{-\frac{1}{2}}$

2. $1+\sin^2\theta$

3. $(1+\sin^2\theta)^{-\frac{1}{2}}$

4. $(1+\cos^2\theta)$

90 If (x, y) lies on the ellipse $9(x-2)^2+16(y-1)^2=144$ then the maximum value of $|x+y|$ is

1. 5 **2.** 2 **3.** 8 **4.** 6

KEY SHEET

PHYSICS :-

1) 3	2) 3	3) 2	4) 2	5) 4	6) 3	7) 3	8) 3	9) 4	10) 2
11) 2	12) 2	13) 4	14) 1	15) 2	16) 4	17) 3	18) 4	19) 3	20) 3
21) 3	22) 2	23) 2	24) 2	25) 4	26) 4	27) 3	28) 2	29) 4	30) 1

CHEMISTRY :-

31) 2	32) 3	33) 1	34) 2	35) 2	36) 4	37) 4	38) 1	39) 4	40) 2
41) 1	42) 2	43) 3	44) 4	45) 3	46) 2	47) 1	48) 4	49) 4	50) 3
51) 4	52) 1	53) 1	54) 4	55) 2	56) 4	57) 1	58) 2	59) 1	60) 3

MATHEMATICS :-

61) 4	62) 1	63) 3	64) 3	65) 1	66) 3	67) 3	68) 4	69) 3	70) 3
71) 2	72) 1	73) 1	74) 2	75) 2	76) 2	77) 4	78) 4	79) 4	80) 2
81) 3	82) 3	83) 2	84) 1	85) 2	86) 4	87) 1	88) 1	89) 3	90) 3

- **Prepared By**

SRI CHAITANYA IIT ACADEMY

Hyderabad