SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR MPC | **JEE MAINS MODEL WT-12** | **Date: 16-08-2020**

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

IMPORTANT INSTUCTIONS:-

JEE MAIN MODEL

MATHEMATICS

Section	Question type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 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: ***BINOMIAL THEOREM EX:6.1 TO 6.2 (binomial theorem positive integral index, middle term numerically greatest term)***

CIRCLES(1.2.11.2.1TANGENTS & NORMALS) EX: 1.3 TO EX: 1.4

1. **If t_r is rth term in the expansion of $\left(2^x+4^{-x}\right)^8$ and $t_3=7t_2$ then $x=$**

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

2. **If S_p and S_q are the coefficients of x^p and x^q respectively in $(1+x)^{p+q}$ then**

1) $S_p \neq S_q$ 2) $s_p=\frac{q}{p}s_q$ 3) $s_p=\frac{p}{q}s_q$ 4) $s_p=s_q$

3. **The term independent of x in the expansion of $\left(\sqrt{x}-\frac{2}{\sqrt{x}}\right)^{18}$ is**

1) ${}^{18}c_9 2^{12}$ 2) ${}^{18}c_6 2^6$ 3) ${}^{18}c_6 2^8$ 4) $-{}^{18}c_9 2^9$

4. **In the binomial expansion of $(a-b)^n$ $n\geq 5$ the sum of 5th and 6th terms is zero the $\frac{a}{b}=$**

1) $\frac{n-5}{6}$ 2) $\frac{n-4}{5}$ 3) $\frac{5}{n-4}$ 4) $\frac{6}{n-5}$

5. $\left(\sqrt{2}+1\right)^6+\left(\sqrt{2}-1\right)^6$

1) 178 2) 192 3) 198 4) 168

6. **The number of rational terms in the expansion of $\left(\sqrt[4]{5}+\sqrt[5]{4}\right)^{100}$ is**

1) 50 2) 5 3) 6 4) 51

7. **if the coefficients of rth, (r+1)th and (r+2)th terms in the expansion of $(1+x)^n$ respectively in the ratio 2:4:5 then (r,n)=**

1) (2, 7) 2) (3, 8) 3) (3, 9) 4) (4, 9)

8. **The coefficient of x^{24} in the expansion of $\left(1+x^2\right)^{12}\left(1+x^{12}\right)\left(1+x^{24}\right)$ is**

1) ${}^{12}c_6$ 2) ${}^{12}c_6+2$ 3) ${}^{12}c_6+4$ 4) ${}^{12}c_6+6$

9. **If α,β be the coefficients of x^4 and x^2 respectively in the expansion of**

$\left(x+\sqrt{x^2-1}\right)^6+\left(x-\sqrt{x^2-1}\right)^6$ then

1) $\alpha+\beta=-30$ 2) $\alpha-\beta=60$ 3) $\alpha-\beta=-132$ 4) $\alpha+\beta=60$

10. **If the fractional part of the number $\frac{2^{403}}{15}$ is $\frac{k}{15}$ then $K=$**

1) 14 2) 8 3) 6 4) 4

11. **Length of the chord of contact of the tangents drawn from (4,6) to the circle $x^2+y^2=25$ is**

1) $15\sqrt{\frac{3}{13}}$ 2) $5\sqrt{\frac{3}{13}}$ 3) $25\sqrt{\frac{3}{13}}$ 4) $50\sqrt{\frac{3}{13}}$

12. **The polar of (2,-1) w.r.t the circle** $x^2+y^2+6x+4y-1=0$ *is* $5x+y+k=0$ **them K =_____**
1) 1 2) 2 3) 3 4) 4

13. **It the polar of any point on the circle** $x^2+y^2=a^2$ *w.r.t* $x^2+y^2=b^2$ *touches* $x^2+y^2=c^2$ **then a,b,c, are in**
1) A.P 2) G.P 3) H.P 4) A.G.P

14. **The inverse point of (1, -1) w.r.t the circle** $x^2+y^2-4x+6y+3=0$ *is*
1) (1, -1) 2) (-1, 1) 3) (2, -2) 4) (3, -3)

15. **The locus of point of intersection of perpendicular tangents to** $x^2+y^2-4x+6y+3=0$ *is*
1) $x^2+y^2-4x+6y-7=0$ 2) $x^2+y^2-4x+6y+7=0$
3) $x^2+y^2-4x+6y+6=0$ 4) $x^2+y^2-4x+6y-3=0$

16. **The slope of the tangents through the point (7, 1) to the circle** $x^2+y^2=25$ **satisfies the equation**
1) $12m^2-7m-12=0$ 2) $12m^2+7m+12=0$ 3) $12m^2-7m+12=0$ 4) $12m^2+7m-12=0$

17. **The locus of the point of intersection of the tangents to the circle** $x=a\cos\theta, y=a\sin\theta$ **at the point whose parametric angles differ by** $\frac{\pi^c}{2}$ **is a circle of area.**
1) $\sqrt{2}\pi a^2$ 2) πa^2 3) $2\pi a^2$ 4) $\frac{\pi a^2}{2}$

18. **The locus of mid points of chords of** $x^2+y^2=a^2$ **which subtends an angle 120^0 at the Centre is**
1) $x^2+y^2=a^2$ 2) $2x^2+2y^2=a^2$ 3) $x^2+y^2=2a^2$ 4) $4x^2+4y^2=a^2$

19. **The maximum area of the re tangle that can be in scribed in the circle by** $x=3+5\cos\theta, y=1+5\sin\theta$ **in unit is**
1) 25 2) 50 3) 100 4) $50\sqrt{2}$

20. **The polares of the point (1, 2) w.r.t circle** $x^2+y^2-14y+6=0$ *and* $x^2+y^2-4x+6y+4=0$
1) coincide 2) are parallel 3) are perpendicular 4) does not exist

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. **The number of non-zero terms in the expansion** $\left(1+3\sqrt{2x}\right)^9+\left(1-3\sqrt{2x}\right)^9$ *is*

22. **The smallest natural number n such that the coefficient of x in the expansion of** $\left(x^2+\frac{1}{x^3}\right)^n$ *is* $n_{C_{23}}$ *is*

23. **If (4, 2) and (K,-3) conjugate points with respect to** $x^2+y^2-5x+8y+6=0$ **then K=_____**

24. **The area of the triangle formed by chord of contact of (4, 1) w.r.t the circle** $x^2+y^2=1$ **and coordinate axis is_____**

25. **If the angle between the tangents from (0, 0) to the circle** $x^2+y^2+10x+10y+40=0$ **is $\tan^{-1}$ (m) them m=_____**

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: ***CURRENT ELECTRICITY POTENTIOMETER, MAGNETISM & MATTER DIPOLE IN A UNIFORM MAGNETIC FIELD***

26. In a potentiometer experiment, when two cells are joined in series to support each other and then joined to oppose each other balancing points are obtained at 6m and 2m respectively. The ratio of their e.m.f.s is:

1) 1:1 2) 2:1 3) 3:1 4) 4:1

27. In a potentiometer experiment the balancing with a call is at length 240cm. on shunting the cell with a resistance of 2 Ω, the balancing length becomes 120cm. The internal resistance of the cell is:

1) 1Ω 2) 0.5Ω 3) 4Ω 4) 2Ω

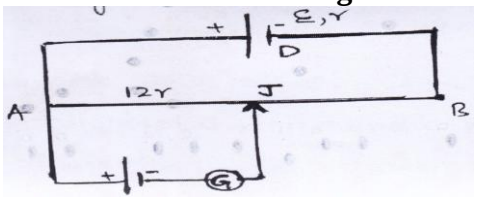
28. A potentiometer wire of length 10m and resistance 30Ω is connected in series with a battery of emf 2.5V, internal resistance 5Ω and external resistance R. If the fall of potential along the potentiometer wire is 50mv/m, the value of R in ohm is

1) 115 2) 80 3) 50 4) 100

29. The resistance of the potentiometer wire is $0.9\,\Omega\,m^{-1}$ the potential gradient is $0.0081 Vcm^{-1}$. Then the current in the wire is

1) 1A 2) 0.9A 3) 0.5A 4) 0.1A

30. A potentiometer wire AB having length L and resistance 12r is joined to a cell D of emf $\frac{\in}{2}$ and internal resistance 'r: A cell C having emf $\frac{\in}{2}$ and internal resistance 3r is connected. The length AJ at which the galvanometer as shown in figure. Shows no defection is :



1) $\frac{5}{12}L$ 2) $\frac{11}{24}L$ 3) $\frac{11}{12}L$ 4) $\frac{13}{24}L$

31. A magnetized wire of magnet moment M and length L is bent in the form of a semicircle of radius r. then its magnetic moment is

1) $\frac{2M}{\pi}$ 2) 2M 3) $\frac{M}{\pi}$ 4) Zero

32. A Thin bar magnet of length 'L' and magnetic moment M is bent at the midpoint so that the two parts are at right angles. The new magnetic length and magnetic moment are respectively.

1) $\sqrt{2}L, \sqrt{2}M$ 2) $\frac{L}{\sqrt{2}}, \frac{M}{\sqrt{2}}$ 3) $\sqrt{2l}, \frac{M}{\sqrt{2}}$ 4) $\frac{L}{\sqrt{2}}, \sqrt{2}M$

33. The force between two magnetic poles reduces to 'a' new tons, if distance between them is increased to 'n' times and force increases to 'b' new tons if the distance between them is $\frac{1}{n}$ th of the original value. Than a: b is

1) 1: n^2 2) n^2:1 3) n^4:1 4) 1: n^4

34. If the distance between two isolated magnetic poles is increased by 3% then the force between them.

1) Increases by 6% 2) decreases by 6% 3) Increased by 3% 4) decreases by 3%

35. The magnetic moment of a dipole is $2Am^2$, the magnetic induction in air at a distance of 10cm from the dipole on a line making an angle of 60^0 with the axis of dipoles is

1) $\sqrt{7}X10^{-5}T$ 2) $\sqrt{7}X10^{-4}T$ 3) $\frac{\sqrt{7}}{2}X10^{-4}T$ 4) $\frac{\sqrt{7}}{2}X10^{-5}T$

36. The pole strength of a 12cm long bar magnet is 20Am. The Magnetic induction at a point 10cm from the Centre of the magnet on its axial line is.

1) $1.1x10^{-3}T$ 2) $2.2x10^{-2}T$ 3) $3.3x10^{-3}T$ 4) $11x10^{-2}T$

37. Two short bar magnets each of magnetic moment 9 Am^2 are placed such that one is at x= -3cm and the other at y= -3cm. If their magnetic moments are directed along positive and negative X- directions respectively then the resultant magnetic field at the origin is.

1) 100 T 2) 10 T 3) 0.1 T 4) 0.01T

38. A bar magnet placed in a uniform magnetic field making an angle θ with the field experiences a torque. If the angle made by the magnet with the field is double. The torque experienced by the magnet increases by 41.4%. The initial angle made by the magnet with the magnetic field is.

1) 60^0 2) 30^0 3) 90^0 4) 45^0

39. A short bar magnet is placed in the magnetic meridian of the earth with north pole pointing north. Neutral point are found at a distance of 30cm from the magnet, The East – west line, drawn through the middle point of the magnet the magnetic moment of the magnet in Am^2 is close to : (Given $\frac{\mu 0}{4\pi}=10^{-7}$ in SI units and B_H = Horizontal Component of earth is magnetic field = $3.6x10^{-5}$ Tesla)

1) 9.7 2) 4.9 3) 19.4 4) 14.6

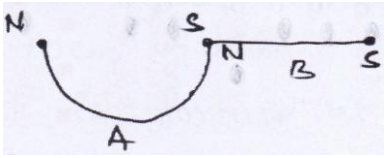
40. A magnetic needle lying parallel to a magnetic field is turned through 60. The work done on it is W. the torque required to maintain the magnetic needle in the position mentioned above is

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

41. A torque of $2x10^{-4}$ N-m is required to hold a magnet at right angle to the magnetic meridian. The torque required to hold it at 30^0 to the magnetic meridian in N –m is

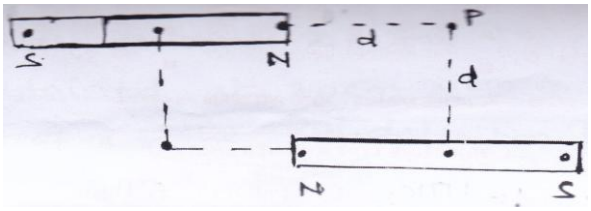
1) $0.5x10^{-4}$ 2) $1x10^{-4}$ 3) $4x10^{-4}$ 4) $8x10^{-4}$

42. A magnet of length L and moment M is cut into two haves (A and B) perpendicular to its axis. One piece A is bent into a semicircle of radius R and is joined to the other piece at the poles as shown in the figure below.



1) $\frac{M}{2\pi}$ 2) $\frac{M}{\pi}$ 3) $\frac{M(2+\pi)}{2\pi}$ 4) $\frac{M\pi}{(2+\pi)}$

43. Two short bar magnets each of magnetic moment M are arranged as shown. The resultant magnetic induction at a point P which is at the same distance'd' from the center of each magnet is.



1) $\frac{\mu o}{4\pi}\frac{\sqrt{5}M}{d3}$ 2) $\frac{\mu o}{4\pi}\frac{3M}{d3}$ 3) $\frac{\mu o}{4\pi}\frac{M}{d3}$ 4) $\frac{\mu o}{4\pi}\frac{\sqrt{2}M}{d3}$

44. Two uniform magnetic fields of inductions 10^{-6} T and $2x10^{-6}$ T are in mutually perpendicular direction. If a bar magnet of magnetic moment $100Am^2$ is making an angle 37^0 with the first field the resultant torque on the magnet is (sin 37^0 = 3/5, sin 53^0 = 4/5)

1) $1x10^{-4}$ Nm 2) $2.2x10^{-4}$ Nm 3) $4x10^{-4}$ Nm 4) $2x10^{-4}$ Nm

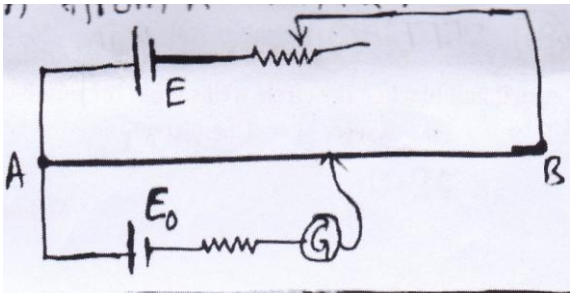
45. A north pole of strength 16 A-m and a south pole of strength 25Am are separated by a distance 10cm in air. on the line joining them null point in formed at a distance of

1) 40cm from the north pole 2) 20cm from the South Pole
3) 20cm from the north pole 4) 40cm from the South Pole

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.

46. Figure shows potentiometer with resistance of the wire AB equal to 10 Ω and a rheostat of variable resistance. For x = 0, null deflection is obtained at 20cm from A. For unknown value of x, the null deflection point was at 30cm from A. Find x.



47. The balancing length for a cell is 560cm in a potentiometer experiment. When an external resistance of 10Ω is connected in parallel to the cell, the balancing length charges by 60cm.If the internal resistance of the cell is $\frac{N}{10}\Omega$ where N is an integer then value of N is _____

48. A short bar magnet placed with its axis at 30^0 with a uniform external magnetic field of 0.25T experiences a torque of magnitude equal to $4.5x10^{-2}$ J. What is the magnitude of magnetic moment of the magnet is _____ JT^{-1} .

49. Given the earth's magnetic field at the equator approximately as 0.4G. The earth's dipole moment is $nx10^{23}$ Am^2 . Find n? (Radius of earth = $6.4x10^6$m).

50. The force of repulsion between two magnetic poles separated by a distance of 10cm in air is 10N. What will be the force (in N) between the poles if the distance between them reduced by 2cm?

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:- SURFACE CHEMISTRYF ROM CATALYSIS TO END.

51. Which of the following catalyst is sensitive to temperature changes

1) Fe 2) Pt 3) Ni 4) Enzyme

52. Which one of the following is not an example of homogeneous catalysis

1) Formation of SO_3 in lead chamber process
2) Formation of SO_3 in contact process
3) Hydrolysis of an ester in presence of an acid
4) Hydrolysis of sugar in presence of sulphuric acid

53. When $KClO_3$ is heated, it decomposes into KCI and O_2. If some MnO_2 is added, the reaction goes much faster because.

1) MnO_2 decomposes to give oxygen 2) MnO_2 provides heat
3) Better contact is provided by MnO_2 4) MnO_2 acts as catalyst

54. The components of Zingler – Natta catalyst used in the polymerization of propylene are.

1) $TiCl_3 + Al(C_2H_5)_3$ 2) $TiCl_4 + Al(C_2H_5)_3$
3) $Ti(C_2H_5)_3 + AlCl_3$ 4) $Ti(C_2H_5)_4 + AlCl_3$

55. Match the following

List – I	**List – II**
A) Ammonia preparation	1. Bio catalyzed
B) Hydrogenation	2. Fe
C) Fermentation	3.Ni
D) $SO_2 + \frac{1}{2}O_2 \xrightarrow{NO} SO_3$	4. Homogeneous

	A	**B**	**C**	**D**
1)	4	3	1	2
2)	3	2	1	4
3)	1	2	4	3
4)	2	3	1	4

56. The catalyst iron employed in the Heber's process contains molybdenum. Whose function is

1) To increase the rate of combination of gases
2) To counter balance for the presence of impurities in the gases.
3) To act as a catalyst promoter and increase activity of catalyst.
4) To make up make up for the adverse temperature and pressure conditions.

Types of catalysis

57. Identify the correct statement regarding enzymes:

1) Enzymes are specific biological catalysts that posses well–defined active sites.
2) Enzymes are normally heterogeneous catalysts that are very specific in their action.
3) Enzymes are specific biological catalysts that cannot be poisoned
4) Enzymes are specific biological catalysts that can normally function very high temperature (T= 1000 K)

58. The number of phases in a colloidal system is

1) 1 2) 2 3) 3 4) 4

59. Blood is colloidal solution of water containing.
1) liquid fat as dispersed phase 2) albuminoid as dispersed phase
3) butter as dispersed phase 4) proteins as dispersed phase

60. Soap emulsifies
1) oil in water type 2) water in oil type 3) oil in oil type 4) get in oil

61. The arsenius sulphide sol has negative charge and the maximum coagulating power for precipitating it is of.
1) $0.1(N)Zn(NO_3)_2$ 2) $0.1(N)Na_3PO_4$ 3) $0.1(N)ZnSO_4$ 4) $0.1(N)AlCl_3$

62. Bredig arc method cannot be used to prepare colloidal solution for which of the following
1) Pt 2) Fe 3) Ag 4) Au

63. Gold number maximum for the lyophilic sol is
1) Gelatin 2) Hemoglobin 3) Sodium oleate 4) Potato starch

64. Which of the following is a non electrolytic colloidal sol?
1) Starch 2) AgClsol 3) Arsenic sulphide sol 4) Gold sol

65. A substance which forms micelles in solutions contains
1) carboxylic group
2) alkyl group
3) water insoluble long hydrocarbon groups and water soluble polar groups
4) Water soluble hydrocarbon group and water insoluble polar group

66. Match the following

List – I	List – II
A. Smoke	1) Gas in liquid
B. Cloud	2) Solid in gas
C. Blood	3) Liquid in gas
D. Froth	4) Liquid in liquid
	5) Solid in liquid

The correct match is

	A	**B**	**C**	**D**
1)	2	3	5	1
2)	4	3	1	2
3)	2	3	1	5
4)	3	2	1	5

67. The volume of a colloidal particle V_c as compared to volume of solute particle V_s in a true solution could be
1) $\frac{V_c}{V_s}=10^{-3}$ 2) $\frac{V_c}{V_s}=10^{3}$ 3) $\frac{V_c}{V_s}=1$ 4) $\frac{V_c}{V_s}=10^{23}$

68. The number of moles of lead nitrate needed to coagulate 2 mol of colloidal $[Agl]I^-$ is
1) 2 2) 1 3) 1/2 4) 2/3

69. Flocculation value is expressed in terms of
1) Millimole per liter 2) Mole per liter 3) Gram per liter 4) Mole per milliliter

70. If gold number of A,B,C and D are 0.005, 0.05,0.5, and 5 respectively, then which of the following will have the highest protective power.
1) A 2) B 3) C 4) D

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. How many of the given catalyst can be used in the manufacture of H_2SO_4?
(I) oxides of nitrogen (II) V_2O5 (III) platinized asbestos (IV) Ni

72. By how many ways a lyophibic colloidal solution can precipitated.
(I) adding lyophibic colloid (II) heating
(III) adding electrolyte (IV) adding oppositely charged colloid

73. How many of the given are protective emulsions?
Milk, cold cream, butter, tonics

74. For the coagulations of 10 ml. of $Fe(OH)_3$ sol,2ml of 1M KBr is required. what is the flocculation value of KBr.
1) 300 2) 200 3) 25 4) 100

75. The coagulation of 200 ml of positive colloid took place when 0.73 gms HCI was added to it with out changing the volume much. The flocculation value of HCI for the colloid is.
1) 36.5 2) 100 3) 200 4) 150

SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR MPC | **JEE MAINS MODEL WT-11** | **Date: 16-08-2020**

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

KEY SHEET

MATHEMATICS

1) 4	2) 4	3) 4	4) 2	5) 3	6) 3	7) 2	8) 2	9) 3	10) 2
11) 1	12) 3	13) 2	14) 3	15) 1	16) 1	17) 3	18) 4	19) 2	20) 2
21) 5	22) 38	23) 9.33	24) 0.12	25) 1.33					

PHYSICS

26) 2	27) 4	28) 1	29) 2	30) 4	31) 1	32) 2	33) 4	34) 2	35) 2
36) 1	37) 3	38) 4	39) 1	40) 1	41) 2	42) 3	43) 2	44) 2	45) 1
46) 5	47) 12	48) 0.36	49) 1.04	50) 15.62					

CHEMISTRY

51) 4	52) 2	53) 4	54) 2	55) 4	56) 4	57) 2	58) 2	59) 2	60) 1
61) 4	62) 2	63) 4	64) 1	65) 3	66) 1	67) 2	68) 2	69) 1	70) 1
71) 3	72) 3	73) 4	74) 200	75) 100					

HINTS & SOLUTIONS

MATHEMATICS

1. $t_3 = 7.T_2$

$8_{C_2}\left(2^x\right)^6.\left(4^{-x}\right)^2 = 7 \quad 8_{C_1}\left(2^x\right)^7\left(4^{-x}\right)^2$

$\Rightarrow 2^{-2x} = 2^{1+x}$

$\Rightarrow x = -\frac{1}{3}$

2. $s_p = p + q_{C_p} \quad s_q = p + q_{C_q}$

$= p + q_{C_q}$

$= s_q$

3. $T_{r+1} = 18_{C_r}\left(\sqrt{x}\right)^{18-r}\left(\frac{-2}{\sqrt{x}}\right)^r$

$= 18_{C_r}\left(2\right)^r x^{\frac{1}{2}(18-r)} x^{\frac{1}{2}r}$

$ut\ \frac{1}{2}(18-r)\frac{-1}{2}r = 0$

$r = 9$

Term independent of x

$= 18_{C_9}\left(-2\right)^9 = -18_{C_9}2^9$

4. $T_5 = T_6 = 0$

$\Rightarrow n_{C_4}\left(a\right)^{n-4}\left(-b\right)^4 + n_{C_5}a^{n-5}\left(-b\right)^5 = 0$

$a^{n-4}\ b^4\left[n_{C_4} - a^{-1}n_{C_5}b\right] = 0$

$\Rightarrow n_{C_4} = n_{C_5}\frac{b}{a}$

$\frac{a}{b} = \frac{n_{C_5}}{n_{C_4}} = \frac{n-5+1}{5}$

$= \frac{n-4}{5}$

5. GE $2\left[6_{C_0}\left(\sqrt{2}\right)^6 + 6_{C_2}\left(\sqrt{2}\right)^4 + 6_{C_4}\left(\sqrt{2}\right)^2 + 6_{C_6}\left(\sqrt{2}\right)^0\right]$

$= 2\left[(1)8 + 15(4) + 15(2) + 1\right]$

$= 2X99 = 198$

6. $\left(5^{\frac{1}{4}} + 4^{\frac{1}{5}}\right)^{100} \quad n = 100$

r = is multiple of 5 and n-r is multiple of 4

r =0, 20,40,60,80,100

7. $n_{C_{r-1}} : n_{C_r} : n_{C_{r+1}} = 2:4:5 = a:b:c$

$r = \dfrac{a(b+c)}{b^2-ac} = \dfrac{18}{6} = 3$

$n = \dfrac{ab+bc+2ac}{b^2-ac} = \dfrac{48}{6} = 8$

8. $\left(1+x^2\right)^{12}\left(1+x^{12}\right)\left(1+x^{24}\right)$

$= \left[12_{C_0} + 12_{C_1}x^2 + 12_{C_2}x^4,,,, + 12_{C_6}x^{12},,,, + 12_{C_{12}}x^{24}\right]\left[1+x^{24}+x^{12}+x^{36}\right]$

Coefficient of x^{24}

$= 12_{C_0} + 12_{C_6} + 12_{C_{12}}$

$= 12_{C_6} + 2$

9. $\left(x+\sqrt{x^2-1}\right)^6 + \left(x-\sqrt{x^2-1}\right)^6$

$= 2\left[6_{C_0}x^6 + 6_{C_2}x^4\left(x^2-1\right) + 6_{C_4}x^2\left(x^2-1\right)^2 + 6_{C_6}\left(x^2-1\right)^3\right]$

$= 2\left[x^6 + 15\left(x^6-x^4\right) + 15\left(x^2\left(x^4+1-2x^2\right)\right) + x^6 - 1 - 3x^4 + 3x^2\right]$

$\therefore coef \quad x^4 = 2(-48) = -96 = \alpha$

$\therefore coef \quad x^2 = 2(18) = 36 = \beta$

$\therefore \alpha - \beta = -132$

10. $2^{403} = \left(2^4\right)^{100} + 3$

$= 8.(16)^{100}$

$= 8.(1+15)^{100}$

$= 8\left[1 + 100_{C_1}(15) + ...100_{C_{100}}15^{100}\right]$

$= 8[1+15K]$

$\dfrac{2^{403}}{15} = \dfrac{8}{15} + \dfrac{8X15K}{15}$

$fractional \quad part = \dfrac{8}{15} = \dfrac{K}{15}$

$K = 8$

11. Draw the diagram chard of contact of 'P' w.r.t $x^2+y^2 = 25$ $4x+6y-25=0$

$d = \dfrac{25}{\sqrt{16+36}} = \dfrac{25}{\sqrt{52}}$

$AB = 2\sqrt{r^2-d^2} = 15\sqrt{\dfrac{3}{13}}$

12. Polar of P(2, 1) w.r.t the circle

$x^2+y^2+6x+4y-1=0$ is $\underline{S_1 = 0}$

$2x-y+3(x+2)+2(y-1)-1=0$

$5x+y+3=0$

13. $P(x_1, y_1)$ *Lies on* $x^2 + y^2 = a^2 \Rightarrow x_1^2 + y_1^2 =$
Polar of P w.r.t $x^2 + y^2 = b^2$
$\Rightarrow xx_1 + yy_1 - b^2 = 0$ ____ 1
Touches the circle
$x^2 + y^2 = c^2$
$\Rightarrow r = d \Rightarrow 1c1 = \frac{b^2}{\sqrt{x_1^2 + y_1^2}} \Rightarrow$

14. Inviter point is $= \left(\frac{x^2 x_1}{x_1^2 + y_1^2}, \frac{x^2 y_2}{x_1^2 + y_1^2} \right)$
$= \left(\frac{4X1}{2}, \frac{4X - 1}{2} \right)$
= (2, -2)

15. $r = \sqrt{s}$
$\sqrt{4+9-3}\sqrt{x_1^2 + y_1^2 - 4x_1 + 6y_1 + 3}$
$10 = x_1^2 + y_1^2 - 4x_1 + 6y_1 + 3$
$\Rightarrow x_1^2 + y_1^2 - 4x_1 + 6y_1 - 7 = 0$

16. $y = mx \pm r\sqrt{1+m^2}$
$y = mx \pm 5\sqrt{1+m^2}$
This passes through (7, 1)
$1 = 7m \pm 5\sqrt{1+m^2}$
$1 - 7m = \pm 5\sqrt{1+m^2}$
s.m.b.s
$(1-7m)^2 = 25(1+m^2)$
$1 + 49m^2 - 14m = 25 + 25m^2$
$24m^2 - 14$
$12m^2 - 7m - 12 - 0$

17. requited ax
$x^2 + y^2 = 2a^2$
$r = \sqrt{2a}$
$Area = 25a^2$

18. use the formula
$s_1 = s_{11}$

19. Area $\sqrt{2r} X \sqrt{2r}$
= $2r^2$

20. use the formula S_1=0

21. n= 9 (add)
The number of terms in G.E is
$\frac{n+1}{2}=5$

22. $\left(x^2+\frac{1}{x^3}\right)^n$

$T_{r+1}=n_{c_r}\left(x^2\right)^{n-r}\left(\frac{1}{x^3}\right)^r$

$=n_{c_r}\ x^{2n-5r}$

$G.T\ 2n-5r=1$

$\Rightarrow r=\frac{2n-1}{5}$

$G.T\ \frac{2n-1}{5}=23$

$n=58$

$G.T\ \frac{2n-1}{5}=n-23$

$2n-1=5n-115$

$3n=114$

$n=38$

23. use the formula $S_{12}=0$

24. $\Delta=\frac{c^2}{2|a6|}$

25. $\tan\left(\frac{\theta}{2}\right)=\frac{r}{\sqrt{s_{11}}}$

PHYSICS

26. $\frac{E_1}{E_2}=\frac{l_1+l_2}{l_1-l_2}$

27. $\nu=\left(\frac{l_1-l_2}{l_2}\right)R$

28. $X=\frac{ER}{\left(R+R_L+r\right)L}$

29. $i=\frac{Potential\ \ gradient}{resis\tan ce\ \ per\ unit\ length}$

30. $x=\frac{\in}{13r}X\frac{12r}{L}=\frac{12\in}{13L}$

$\frac{\notin}{2}=X\ l^1=\left(\frac{12\notin}{3L}\right)l^1$

$l^1=\frac{13}{24}L$

31. M=mL
M^1 =m(2r)

$=m\left(\frac{2L}{\pi}\right)$

$=\frac{2M}{\pi}$

32. $L^1 = \frac{L}{\sqrt{2}}, M^1 = \frac{M}{\sqrt{2}}$

33. $a = \frac{\mu 0}{4\pi}\frac{m_1 m_2}{n^2 d^2}$

$b = \frac{\mu 0}{4\pi}\frac{m_1 m_2 n^2}{d^2}$

34. $\left(\frac{\Delta d}{d}\right) X100 = 3\%$

$\frac{\Delta F}{F} X100 = -2X\left(\frac{\Delta d}{d} X100\right)$

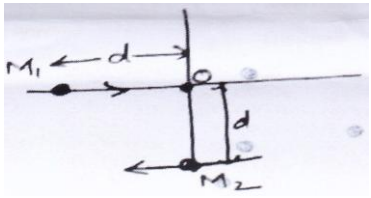
$= -2X3\%$

$= -6\%$

35. $B = \frac{\mu 0}{4\pi}\frac{M}{d3}\sqrt{1+3cas^2\theta}$

36. $Ba = \frac{\mu 0}{4\pi}\frac{2Md}{\left(d^2 - l^2\right)^2}$

37.



Origin

$B_1 = \frac{\mu 0 X 2M}{4\pi d^3}, B_2 = \frac{\mu 0 M}{4\pi d^3}$

$B = B_1 + B_2 = \frac{\mu 0}{4\pi d^3} 3M$

$= \frac{10^{-7} X 3X 9}{3^3 X 10^{-6}} = 0.1T$

38. Replace T with

T=MB sin θ

$\frac{T_1}{T_2} = \frac{\sin\theta_1}{\sin\theta_2} \Rightarrow \frac{100}{141.4} = \frac{\sin\theta}{\sin 2\theta}$

$\frac{1}{1.414} = \frac{\sin\theta}{2\sin\theta\cos\theta} \Rightarrow \frac{2}{1.414} = \frac{1}{\sin\theta}$

$cas\theta = \frac{1}{\sqrt{2}} \Rightarrow \theta = 45^0$

39. At 30cm from the magnet on its equatorial plane

$\vec{B}_{magnet} = -\vec{B}_M \left(neutral\ \ point\right)$

$\frac{\mu 0}{4\pi}\frac{M}{r3} = 3.6X10^{-5}$

$M = 9.7Am^2$

40. W=MB $\left(1 - cas\theta\right)$

41. $T = MB\sin\theta$

42. $M^1 = \dfrac{2\left(M/2\right)}{\pi} + \dfrac{M}{2}$

43. $\vec{B} = \vec{B}_1 + \vec{B}_2 : \theta = 0^0$

$B = \dfrac{\mu 0}{4\pi}\dfrac{2M}{d^3} + \dfrac{\mu 0}{4\pi}\dfrac{M}{d^3}$

$B = \dfrac{\mu 0}{4\pi}\dfrac{3M}{d^3}$

44. $T = MB\sin 90^0$

$T = M\left(\dfrac{\mu 0}{4\pi}\dfrac{M}{d^3}\right)$

45. $r = \dfrac{d}{1+\sqrt{\dfrac{m_2}{m_1}}}$

From the week pole m_1 strength

Where $m_2 > m_1$

46. Terminal pd across wire AB,

$V = \dfrac{ER}{R+r} = \dfrac{EX10}{10+r}$

$\therefore V = E \ if \ x = 0$

Potential gradient $= \dfrac{V}{L} = \dfrac{E}{L}$

The cell of emf E_0 is balanced against length 20cm

$\therefore E_0 = \dfrac{E}{L} X\, 20$ ----1

If a value x is included in the rheostat then terminal pd is

$V^1 = \dfrac{ER}{R+r} = \dfrac{EX10}{10+x}$

Potential gradient $= \dfrac{V^1}{L} = \left(\dfrac{10 \in}{10+x}\right)\dfrac{1}{L}$

Now balancing length is 30cm.

$E_0 = \left(\dfrac{10E}{10+x}\right)\dfrac{1}{L} X\, 30 = \left(\dfrac{10}{10+x}\right)\dfrac{E}{L} X\, 30$

$= \left(\dfrac{10}{10+x}\right)\dfrac{E_0}{20} X\, 30$

$\Rightarrow 10 + x = 10X1.5 = 15$

$\therefore x = 5\Omega$

47. $r = R\left[\dfrac{l_1}{l_2} - 1\right]$

$r = 10\left[\dfrac{560}{500} - 1\right] = 12\Omega \Rightarrow N = 12$

48. $T = MB\sin\theta$

49. $B_{\in} = \dfrac{\mu 0}{4\pi}\dfrac{M}{r3}$

50. $\dfrac{F_2}{F_1} = \left(\dfrac{d_1}{d_2}\right)^2$

CHEMISTRY

51. Conceptual
52. Conceptual
53 Conceptual
54. Conceptual
55. Conceptual
56. Conceptual
57. Conceptual
58. Conceptual
59. Conceptual
60. Conceptual

61. Greater the charge, greater the coagulating power

62. Fe does not react with alkalies.
63. Conceptual
64. Conceptual

65. Conceptual

66. Conceptual

67 $\frac{V_c}{V_s}=\left(\frac{r_c}{r_s}\right)^3=\left(\frac{10}{1}\right)^3=10^3.$

68. $\left[AgI\right]I^- + pb^{+2} \rightarrow pbI_2 + 2AgI.$

69. Conceptual

70. Protective power $\propto \frac{1}{Gold\ \ number}$

71. Conceptual
72. Conceptual
73. Conceptual

74. 2ml of M KBr

Containg KBr = $\frac{1}{1000} X\, 2 = 2m\,mole$

10ml of $(ewH)_3$ sol requires KBr for complete coagulation = 2mmole,
100 ml sol requires 200ml of KBr.

75. 200 ml of sol requires 0.73gm of HCl.

Moles of HCI= $\frac{0.73}{36.5} = 0.02\ mole$

$IL\ sol\ requires = \frac{20}{200} X 1000$

$= 100\ mmole.$

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