JEE MAIN 2025

Sample Paper - 10

Time Allowed: 3 hours **Maximum Marks: 300**

General Instructions:

1. There are three subjects in the question paper consisting of Physics (Q. no. 1 to 25), Chemistry (Q, no. 26 to 50), and Mathematics (Q. no. 51 to 75).

2. Each subject is divided into two sections. Section A consists of 20 multiple-choice questions & Section B consists of 5 numerical value-type questions.

3. There will be only one correct choice in the given four choices in Section A. For each question for Section A, 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice questions and zero marks will be awarded for not attempted questions.

4. For Section B questions, 4 marks will be awarded for correct answers and zero for unattempted and incorrect answers.

5. Any textual, printed, or written material, mobile phones, calculator etc. is not allowed for the students appearing for the test.

6. All calculations/written work should be done in the rough sheet is provided with the Question Paper.

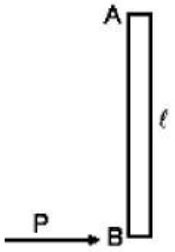
PHYSICS **MAX.MARKS: 100**

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.

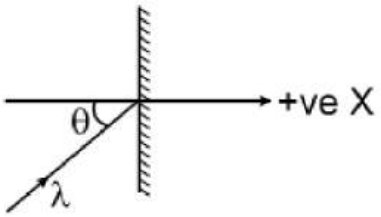
Marking scheme: +4 for correct answer, 0 if not attempted and -1 if not correct.

1. A uniform rod AB of mass m and length l at rest on a smooth horizontal surface. An impulse P is applied to the end B. The time taken by the rod to turn through a right angle is:



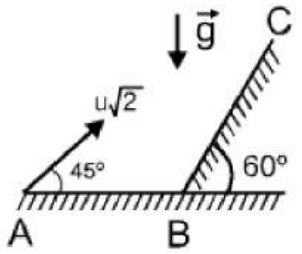
A) $\frac{2\pi m\ell}{P}$ B) $\frac{\pi m\ell}{3P}$ C) $\frac{\pi m\ell}{12P}$ D) $\frac{2\pi m\ell}{3P}$

2. A photon of light of wavelength 'λ' collides with a surface kept perpendicular to the x-axis as shown in the figure. The change in momentum of the photon is :



A) $-\frac{2h}{\lambda}\cos\theta\hat{i}$ B) $\frac{2h}{\lambda}\cos\theta\hat{i}$ C) $\frac{2h}{\lambda}\hat{i}$ D) $\frac{-2h}{\lambda}\sin\theta\hat{i}$

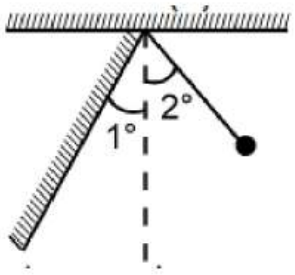
3. A particle is projected from point 'A' with velocity $u\sqrt{2}$ at an angle of 45^0 with the horizontal as shown in the figure. It strikes the inclined plane BC at right angle. The velocity of the particle just before the collision with the inclined is :



A) $\frac{\sqrt{3}u}{2}$ B) $\frac{u}{2}$ C) $\frac{2u}{\sqrt{3}}$ D) u

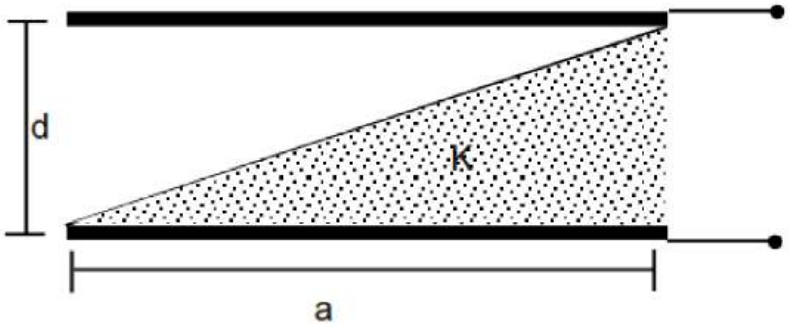
4. A simple pendulum of length 1 m is allowed to oscillate with amplitude 2°. It collides elastically with a wall inclined at 1° to the vertical. Its time period will be :

(use $g = \pi^2$)



A) 2/3 sec B) 4/3 sec C) 2 sec D) None of these

5. A parallel plate capacitor is made of two square plates of side 'a', separated by a distance d (d $\ll$ a). The lower triangular portion is filled with a dielectric of dielectric constant K, as shown in the figure,. Capacitance of this capacitor is :



A) $\frac{K \in_0 a^2}{2d(K+1)}$ B) $\frac{K \in_0 a^2}{d} \ell n k$ C) $\frac{K \in_0 a^2}{d(K-1)} \ell n k$ D) $\frac{1}{2}\frac{K \in_0 a^2}{d}$

6. For an ideal gas the instantaneous change in pressure 'p' with volume 'v' is given by the equation $\frac{dp}{dv} = -ap$. If $p = p_0$ at v = 0 is the given boundary condition, then the maximum temperature one mole of gas can attain is : (Here R is the gas constant)

A) $\frac{ap_0}{eR}$ B) $\frac{p_0}{aeR}$ C) infinity D) 0^0C

7. The magnetic induction and the intensity of magnetic field inside an iron pole of an electromagnet are 10 $Wb\ m^{-2}$ and 250 Am^{-1} respectively. What is the relative permeability of iron ? $\left(\mu_0 = 4\pi \times 10^{-7} \text{Hm}^{-1}\right)$

A) $\frac{10^5}{6\pi}$ B) $\frac{10^5}{\pi}$ C) $\frac{10^5}{3\pi}$ D) $\frac{10^5}{5\pi}$

8. A travelling wave $y = A\sin(kx - \omega t + \theta)$ passes from a heavier string to a lighter string. The reflect wave has amplitude 0.5A. The junction of the strings is at x = 0. The equation of the reflected wave is

A) $y' = 0.5A\sin(kx + \omega t + \theta)$ B) $y' = -0.5A\sin(kx + \omega t + \theta)$

C) $y' = -0.5A\sin(\omega t - kx - \theta)$ D) $y' = -0.5A\sin(kx + \omega t - \theta)$

9. In Young's double slit experiment, we get 60 fringes in the field of view for monochromatic light of wavelength $4000A^0$. If we use monochromatic light of wavelength $6000\ A^0$ then the number of fringes that would be obtained in the same field of view is :

A) 60 B) 90 C) 40 D) 1.5

10. A comet is in elliptical orbit around the sun. In this orbit the comet's smallest distance from the sun is 72×10^6 m and its largest distance from the sun is $144\times10^6\ m$. The ratio of comet's maximum speed to the minimum speed in the orbit is:

(Neglect the presence of all bodies other than the sun and comet).

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

11. A bar magnet falls with its north pole pointing down through the axis of a copper ring. When viewed from above, the current in the ring will be

A) clockwise while the magnet is above the plane of the ring, and counter clockwise while below the plane of the ring

B) Counter clockwise throughout

C) Counter clockwise while the magnet is above the plane of the ring, and clockwise while below the plane of the ring

D) Clockwise throughout.

12. Under similar conditions of temperature and pressure, In which of the following gases the velocity of sound will be largest.

A) H_2 B) N_2 C) He D) CO_2

13. A luminous point object is moving along the principal axis of a concave mirror of focal length 12 cm towards it. When its distance from the mirror is 20 cm its velocity is 4 cm/s. The velocity of the image in cm/s at that instant is

A) 6, towards the mirror

B) 6, away from the mirror

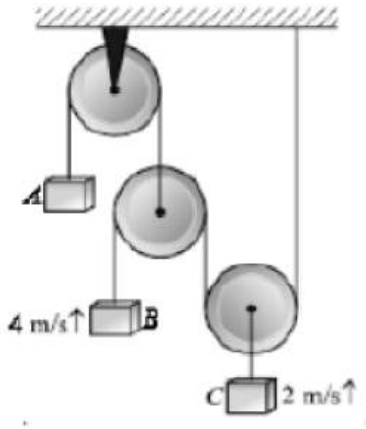
C) 9, away from the mirror

D) 9, towards the mirror

14. The Current voltage relation of diode is given by $I = \left(e^{1000V/T} - 1\right) mA$, where the applied voltage V is in volts and the temperature T is in degree Kelvin. If a student makes an error measuring ± 0.01V while measuring the current of 5 mA at 300K, what will be the error in the value of current in mA ?

A) 0.2 mA B) 0.02 mA C) 0.5 mA D) 0.05 mA

15. In the pulley system shown in figure, block C is going up at 2 m/s and block B is going up at 4 m/s, then the velocity of block A on the string shown in figure, is equal to :

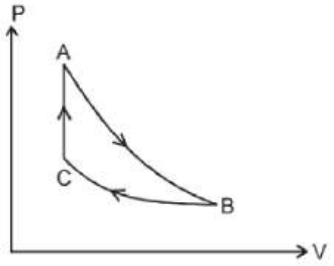


A) 2 m/s ↓ B) 4 m/s ↓ C) 6 m/s ↓ D) 8 m/s ↓

16. 32 g of O_2 is contained in a cubical container of side 1m and maintained at a temperature of 127^0C. The isothermal bulk modulus of elasticity of the gas in terms of universal gas constant R is

A) 127 R B) 400 R C) 200 R D) 560 R

17. An ideal gas undergoes a cyclic process, in which one process is isochoric, one process is isothermal and one process is adiabatic. During the isothermal process, 40 J heat is released by the gas, and during the isochoric process, 80 J heat is absorbed by the gas. If work done by the gas during adiabatic process is W_1 and during isothermal process is W_2 then $\frac{W_1}{W_2}$ will be equal to

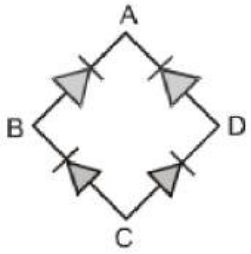


A) -2 B) 2 C) 4 D) -1/2

18. r.m.s. value of current $i = 3 + 4\sin(\omega t + \pi/3)$ is:

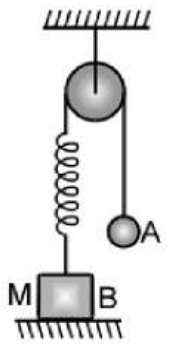
A) 5A B) $\sqrt{17}$A C) $\frac{5}{\sqrt{2}}$A D) $\frac{7}{\sqrt{2}}$A

19. For the given circuit shown in fig, to act as full wave rectifier, a.c. input should be connected across .....and.....the d.c. output would appear across.....and.....



A) A, C and B, D B) B, D and A, C C) A, B and C, D D) C, A and D, B

20. In the Figure, the ball A is released from rest when the spring is at its natural length. For the block B, of mass M to leave contact with the ground at some stage, the minimum mass of A must be:



A) 2M B) M C) M/2

D) A function of M and the force constant of the spring.

SECTION-II
(NUMERICAL VALUE ANSWER TYPE)

This section contains 5 questions. The answer to each question is a Numerical value. If the Answer in the decimals , **Mark nearest Integer only.**

Marking scheme: +4 for correct answer, -1 in all other cases.

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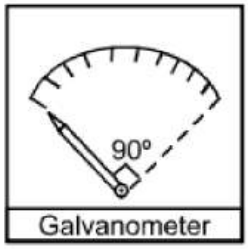
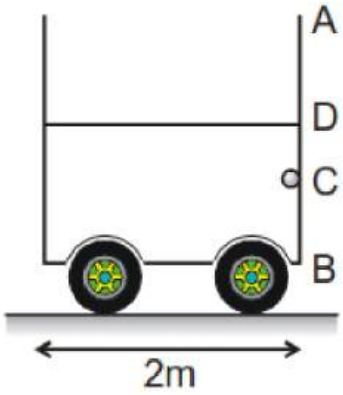
21. A small block a placed on the top of a smooth fixed sphere of radius 60 cm. Block slightly pushed so that it starts sliding on the sphere. Find the speed (in m/s) of the block when it leaves the sphere ? ($g = 10\ m/s^2$)

22. In a moving coil galvanometer, a coil of area $\pi\,cm^2$ and 10 windings is used. Magnetic field strength applied on the coil is 1 tesla and torsional stiffness of the torsional spring is $6\times10^{-5}\ N.m/rad$. A needle is welded with the coil. Due to limited space, the coil (or needle) can rotate only by 90^0, For marking, the 90^0 space is equally devided into 10 parts as shown. Find the least count of this galvanometer in mA.

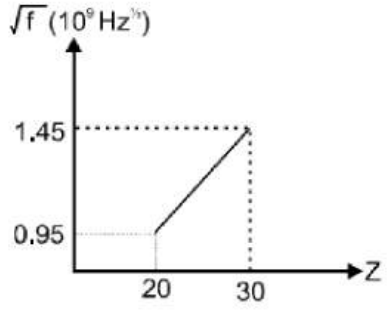


23. A cubical container with side 2 m has a small hole with a cap at point C as shown. The water level is upto point D. (BC = 0.5 m and BD = 1.5 m). If container is given an acceleration of 8 m/s^2 and the hole is opened simultaneously, find the amount of water that will spill out of the container (in litres)



24. A boat has to cross a river as soon as possible. In doing so it takes 4 sec less than if it travels by shortest path. Let the width of the river is 'd'. Velocity of river water is 8 m/s and boat can travel in still water with a velocity of 17 m/s. Find the value of $\frac{d}{170}$.

25. Moseley plot for $k_{\alpha} - X - ray$ is shown. If Moseley equation is given by $\sqrt{f} = a(Z - b)$. If constant 'a' is given by $5 \times 10^{P} Hz^{1/2}$ then 'P' is :



CHEMISTRY **MAX.MARKS: 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.

26. **Assertion A:** s-orbital electron will be more tightly bound to the nucleus than p-orbital electron.

Reasons R: Z_{eff} experienced by the electron decreases with increased of azimuthal quantum number (l)

A) Both A and R are correct; R is the correct explanation of A.

B) Both A and R are correct ; R is not the correct explanation of A.

C) A is correct ; R is incorrect.

D) A is incorrect ; R is correct.

27. Consider the following statement about the equilibrium. $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g); \Delta H^0 = -198\,kJ$

I) On decreasing the temperature as well as pressure equilibrium shifts in forward direction.

II) On increasing temperature and pressure equilibrium shifts in forward direction.

III) On decreasing the temperature and increasing the pressure, equilibrium will shifts in forward direction.

Choose the correct statement.

A) I and II B) Only II C) Only III D) I, II and III

28. Identify the set from the following sets in which all species can exhibit disproportionation reactions.

A) $Cl_2, ClO_2^-, ClO_3^-, S_8$ B) $ClO_4^-, ClO^-, ClO_2^-, F_2$

C) $ClO_3^-, ClO_4^-, H_2O_2, ClO^-$ D) $ClO_2^-, ClO_3^-, ClO_4^-, Cl_2$

29. Match the Column I with Column II and choose the correct option from the codes give below.

Column I (Coordination compound)		Column II (Uses in medicinal chemistry)	
A)	cis-platin	1)	Removal of excess of Cu
B)	EDTA	2)	Removal of excess of Fe
C)	Desferrioxime-B	3)	Lead poisoning
D)	D-penicillammine	4)	Tumours

(A) (B) (C) (D) **(A) (B) (C) (D)**

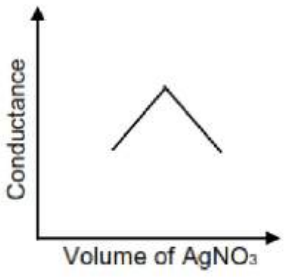
A) 1 2 3 4 B) 2 4 1 3

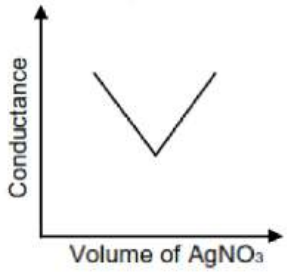
C) 3 1 4 2 D) 4 3 2 1

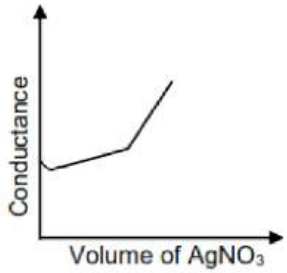
30. In which of the following processes, the bond order decreases and diamagnetic character changes to paramagnetic one?

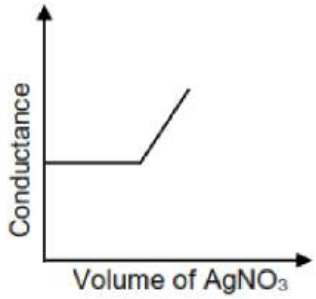
A) $O_2 \rightarrow O_2^+$ B) $N_2 \rightarrow N_2^+$ C) $O_2^{2-} \rightarrow O_2$ D) $NO \rightarrow O^+$

31. Choose the correct representation of conductometric titration of potassium chloride vs silver nitrate.

A) 

B) 

C) 

D) 

32. Two solutions A and B are prepared by dissoving 1 g of non-volatile solutes X and Y, respectively in 1kg of water. The ratio of depression in freezing points for A and B is found to be 1 : 5. The ratio of molar masses of X and Y is

A) 1 : 4 B) 1 : 0.25 C) 1 : 0.20 D) 1 : 5

33. For a first order reaction, the time required for completion of 75% reaction is 'x' times the half life of the reaction. The value of 'x' is : (Given: ln 10 = 2.303 and ln2 = 0.3010)

A) 1.12 B) 2.0 C) 3.32 D) 33.31

34. Match the electronic configuration of some elements in list I and their electron gain enthalpies are given in list II.

LIST-I (Electronic configuration)		**LIST –II (Electron gain enthalpy/Kj mol^{-1})**	
A)	$1s^2 2s^2 2p^6$	I)	-53
B)	$1s^2 2s^2 2p^6 3s^1$	II)	-328
C)	$1s^2 2s^2 2p^5$	III)	-141
D)	$1s^2 2s^2 2p^4$	IV)	+ 48

Choose the correct answer from the option given below :

A) A–IV; B–I; C–II; D–III B) A–I; B–II; C–III; D–IV

C) A–III; B–II; C–I; D–IV D) A–II; B–IV; C–I; D–III

35. Highest oxidation state of Cr is exhibited in $Cr_2O_7^{2-}$. The correct statements about $Cr_2O_7^{2-}$ are

A) Cr is tetrahedrally surrounded by oxygen atoms.

B) Cr is octahedrally surrounded by oxygen atoms.

C) Contains Cr-O-Cr bridge.

D) Contains Cr-Cr bond.

36. During the borax bead test with $CuSO_4$, a blue green colour of the bead was observed in oxidising flame due to the formation of_____.

A) Cu_3B_2 B) $Cu(BO_2)_2$ C) Cu D) CuO

37. Match the element in list-I with the density in list-II.

LIST-I (Element)		LIST –II (Density gcm^{-3} at 295K)	
P)	Ga	I)	11.85
Q)	In	II)	5.90
R)	Al	III)	2.70
S)	B	IV)	7.31
T)	TI	V)	2.35

Choose the correct answer from the option given below :

A) P–II; Q–IV; R–III; S–V; T-I

B) P–III; Q–V; R–I; S–IV; T-II

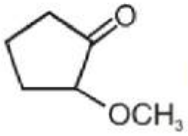
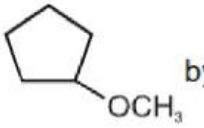
C) P–II; Q–V; R–IV; S–I; T-III

D) P–I; Q–IV; R–III; S–II; T-V

38. Select the true/false statements

S_1 : The rate of catalytic hydrogenation of 2–butyne is greater than trans–2–butene.

S_2 : The aqueous solution of CH_3MgBr is used for SN^2 reaction with primary alkyl halides.

S_3 :  is reduced to  by using Zn(Hg)/HCl on heating.

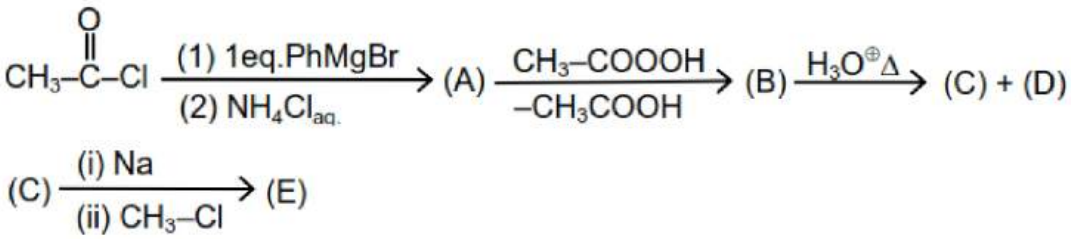
A) F F F

B) T F T

C) T F F

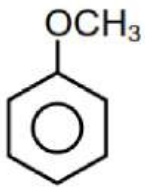
D) T F T

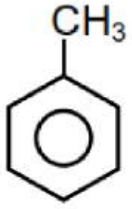
39.

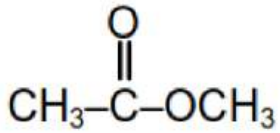


Compound (D) gives CO_2 gas with $NaHCO_3$, then the structure of (E) is

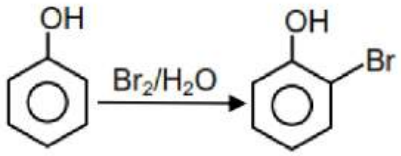
A) $CH_3 - O - CH_3$

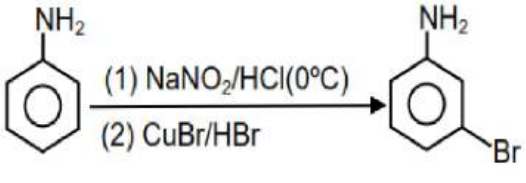
B) 

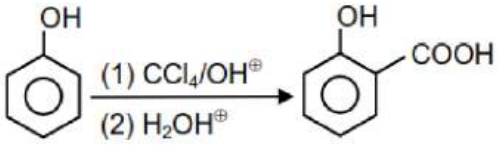
C) 

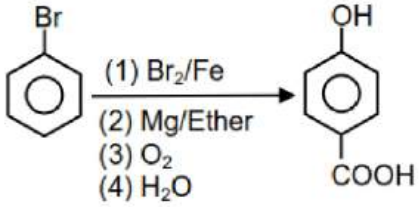
D) 

40. Which of the following is correctly matched with major product :

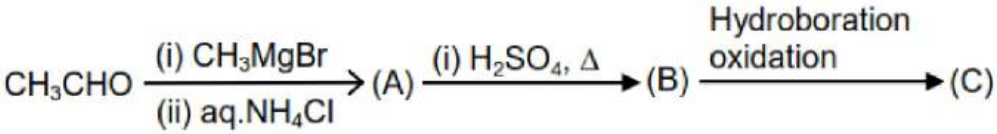
A) 

B) 

C) 

D) 

41. The relation between compounds (A) and (C) is :



A) Identical B) Positional isomers C)Functional isomers D)Optical isomers

42. Consider the following reactions

(I) D-Glucose $\xrightarrow{NaBH_4}$ X

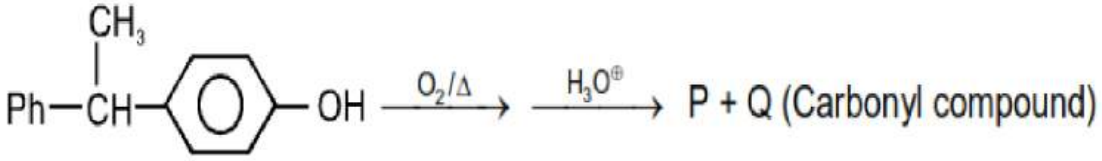
(II) D-Mannose $\xrightarrow{NaBH_4}$ Y

(III) D-Fructose $\xrightarrow{NaBH_4}$ Product

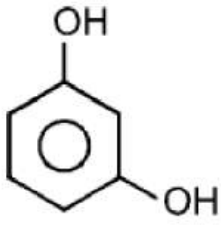
The product/s in reaction (III) is / are

A) X only B) Y only C) Neither X nor Y D) Both X and Y

43. In following reaction most probable product (P) is :



A) PhOH B) CH_3OH C) 

D) 

44. Which of the following is correct match for the given reactions ?

A) $C_6H_6 + CH_3–CH=CH_2 \xrightarrow{H^+}$ [Gattermann-Koch reaction]

B) $C_6H_6 + CO + HCl \xrightarrow{AlCl_3}$ [Etard reaction]

C) $C_6H_5–CH_3 + CrO_2Cl_2 \xrightarrow{CS_2}$ [Friedel Craft reaction]

D) $Ph\overset{+}{N}_2\overset{-}{C} + CuBr + HBr \longrightarrow$ [Sandmeyer reaction]

45. A compound (P) on reaction with "Q" in basic medium (KOH) gives a bad smelling compound (CH_3CH_2NC). Compound Q can be prepare by reaction of acetone with calcium hypochlorite $\left(Ca(OCl)_2\right]$. P and Q can

A) $CH_3-CH_2-NH_2$ & $CHCl_3$ B) $CH_3-CH_2-NO_2$ & CH_3Cl

C) $CH_3-CH_2-NH-CH_3$ & $COCl_2$ D) $(CH_3-CH_2)_3N$ & Cl_2

SECTION-II
(NUMERICAL VALUE ANSWER TYPE)

This section contains 5 questions. The answer to each question is a Numerical value. If the Answer in the decimals , **Mark nearest Integer only.**

Marking scheme: +4 for correct answer, -1 in all other cases.

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46. On balancing the given redox reaction.

$$aCr_2O_7^{2-} + bSO_3^{2-}(aq) + CH^+(aq) \longrightarrow 2aCr^{3+}(aq) + bSO_4^{2-}(aq) + \frac{c}{2}H_2O(\ell)$$

47. The heats of combustion of carbon and carbon monoxide are –393.5 and –283.5 kJ mol^{-1}, respectively. The magnitude of heat of formation (in kJ) of carbon monoxide per mole is_____ kJ/mol.

48. According to MO theory the sum of bond orders for O_2^{-2}, CO and NO^+ is_____

49. Solute A associates in water. When 0.7 gram of solute A is dissolved in 42.0 gram of water, it depresses the freezing point by 0.2°C. The percentage association of solute A in water, is :

[Given : Molar mass of $A = 93\ g\ mol^{-1}$. Molal depression constant of water is $1.86\ K\ Kg\ mol^{-1}$]

50. At 30^0C, the half life for the decomposition of AB_2 is 200 s and is independent of the initial concentration of AB_2. The time required for 90% of the AB_2 to decompose is _____ sec. (Nearest integer) (Given : log 2 = 0.30 ; log 3 = 0.48)

MATHEMATICS **MAX.MARKS: 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.

51. Simplest form of $\cot^{-1}\left(\frac{\sqrt{1+\sin x}-\sqrt{1-\sin x}}{\sqrt{1+\sin x}+\sqrt{1-\sin x}}\right), x \in \left(0, \frac{\pi}{4}\right)$ is

A) $\frac{\pi}{4}-\frac{x}{2}$ B) $\frac{\pi}{4}+\frac{x}{2}$ C) $\frac{\pi}{2}-\frac{x}{2}$ D) $\frac{\pi}{2}+\frac{x}{2}$

52. If the sides a, b & c of a triangle ABC are in G.P. then $\angle B$ can never be

A) $\frac{\pi}{6}$ B) $\frac{\pi}{12}$ C) $\frac{\pi}{4}$ D) $\frac{2\pi}{3}$

53. If the eccentricity of the ellipse $\frac{x^2}{a^2+1}+\frac{y^2}{a^2+2}=1$ is $\frac{1}{\sqrt{6}}$, then the latus rectum of the ellipse is

A) $\frac{5}{\sqrt{6}}$ B) $10\sqrt{6}$ C) $\frac{8}{\sqrt{6}}$ D) $\frac{10}{\sqrt{6}}$

54. If $I_1 = \int_{-100}^{101} \frac{dx}{(5+2x-2x^2)(1+e^{2-4x})}$ and $I_2 = \int_{-100}^{101} \frac{dx}{5+2x-2x^2}$, then $\frac{I_1}{I_2}$ is_____

A) 2 B) $\frac{1}{2}$ C) 1 D) $-\frac{1}{2}$

55. In a bag there are 4 Red, 3 Black, 2 Green Balls. Balls are drawn one by one without replacement. What is the probability that first green ball is drawn in third draw.

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{6}$ D) $\frac{2}{3}$

56. Locus of the mid-point of the chords of the hyperbola $x^2-y^2=a^2$, that touch the parabola $y^2=4ax$, is

A) $x^2(x-a)=y^3$ B) $y^2(x-a)=x^3$ C) $x^3(x-a)=y^2$ D) $y^3(x-a)=x^2$

57. The number of integral values in the range of function, $f(x) = x^3 - x^2 + 4x + 2\ sin^{-1}x$.

A) 8 B) 10 C) 15 D) more than 15

58. Let the equations of two sides of a triangle be $3x - 2y + 6 = 0$ and $4x + 5y - 20 = 0$. If the orthocenter of this triangle is at (1, 1), then the equation of its third side is :

A) 26x – 122y – 1675 = 0 B) 26x + 61y + 1675 = 0

C) 122y – 26x – 1675 = 0 D) 122y + 26x + 1675 = 0

59. If $f(x) + f\left(\sqrt{1-x^2}\right) = 2$, $\int_0^1 \frac{f(x)dx}{\sqrt{1-x^2}}$ is equal to

A) 0 B) $\frac{\pi}{2}$ C) π D) 2π

60. The mean and standard deviation for the following data is:

Wages upto (in Rs.)	15	30	45	60	75	90	105	120
No. of workers	12	30	65	107	157	202	222	230

A) 60.65, 26.88 B) 65.65, 25.88 C) 60.65, 25.88 D) 60, 26

61. Let $x, \vec{y}$ and $\vec{z}$ be three vectors each of magnitude $\sqrt{2}$ and the angle between each pair of them is $\frac{\pi}{3}$. If $\vec{a}$ is a nonzero vector perpendicular to $\vec{x}$ and $\vec{y} \times \vec{z}$ and $\vec{b}$ is a nonzero vector perpendicular to $\vec{y}$ and $\vec{z} \times \vec{x}$, then which of the following is INCORRECT

A) $\vec{b} = (\vec{b}.\vec{z})(\vec{z} - \vec{x})$ B) $\vec{a} = (\vec{a}.\vec{y})(\vec{y} - \vec{z})$

C) $\vec{a}.\vec{b} = -(\vec{a}.\vec{y})(\vec{b}.\vec{z})$ D) $\vec{a} = (\vec{a}.\vec{y})(\vec{z} - \vec{y})$

62. Let $s = \frac{8}{5} + \frac{16}{65} + \frac{24}{325} + ... + \frac{128}{2^{18}+1}$, then

A) $s = \frac{1088}{545}$ B) $s = \frac{545}{1088}$ C) $s = \frac{1056}{545}$ D) $s = \frac{545}{1056}$

63. If two events A and B are such that $P(\overline{A})=\frac{3}{10}$, $P(B)=\frac{2}{5}$ and $P(A\cap\overline{B})=\frac{1}{2}$ then $P\left(\frac{B}{A\cup\overline{B}}\right)$ is equal to

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{2}{3}$

64. The equation of the plane passing through the points (2, –1, 0), (3, –4, 5) and parallel to the line $2x = 3y = 4z$ is

A) $125x - 90y - 79z = 340$ B) $32x - 21y - 36z = 85$

C) $73x + 61y - 22z = 85$ D) $29x - 27y - 22z = 85$

65. The area bounded by the two branches of curve $(y-x)^2=x^3$ and straight line x = 1 is

A) $\frac{1}{5}$ sq. units B) $\frac{3}{5}$ sq. units C) $\frac{4}{5}$ sq. units D) $\frac{8}{5}$ sq. units

66. A seven digit number without repetition and divisible by 9 is to be formed by using 7 digits out of 1, 2, 3, 4, 5, 6, 7, 8, 9. The number of ways in which this can be done is

A) 9 ! B) $2\times7!$ C) $4\times7!$ D) $9!-2\times7!$

67. The lines $\frac{x-1}{2}=\frac{y}{-1}=\frac{z}{2}$ and $x-y+z-2=0=\lambda x+3z+5$ are coplanar for $\lambda =$

A) $-\frac{97}{11}$ B) $-\frac{43}{5}$ C) $-\frac{73}{9}$ D) $-\frac{31}{7}$

68. The solution of differential equation $2x^3ydy+(1-y^2)(x^2y^2+y^2-1)dx=0$ is

A) $x^2y=(cx-1)(1-y)$ B) $x^2y^2=(cx-1)(1-y^2)$

C) $x^2=(cy-1)(1-x)$ D) $y^2=(cx-1)(1-y^2)$

69. Let A is set of all real values of a for which equation $x^2-ax+1=0$ has no real roots and B is set of all real values of b for which $f(x)=bx^2+bx+0.5>0$, $\forall\in R$ then $A\cap B=$

A) $\{x:0<x<2\}$ B) $\{x:0\le x<2\}$ C) $\{x:0\le x\le 2\}$ D) $\{x:-2<x<2\}$

70 Let $f(x)=\begin{cases}\int_0^x \{1+|1-t|\}\,dt, & x>2\\ 5x-7 & x\le 2\end{cases}$, then f(2) is

A) Continuous but not differentiable

B) Continuous and differentiable

C) Non continuous and non differentiable

D) Differentiable but not continuous

SECTION-II
(NUMERICAL VALUE ANSWER TYPE)

This section contains 5 questions. The answer to each question is a Numerical value. If the Answer in the decimals , **Mark nearest Integer only.**

Marking scheme: +4 for correct answer, -1 in all other cases.

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71. A cylindrical container is to be made from certain solid material with the following constraints: It has fixed inner volume of $V\,mm^3$, has a 2 mm thick solid wall and is open at the top. The bottom of the container is solid circular disc of thickness 2 mm and is of radius equal to the outer radius of the container.

If the volume of the material used to make the container is minimum when the inner radius of the container is 10 mm, then the value of $\frac{V}{250\pi}$ is

72. For a complex number z, let Re(z) denote the real part of z. let S be the set of all complex numbers z satisfying $z^4-|z|^4=4iz^2$, where $i=\sqrt{-1}$. Then the minimum possible value of $|z_1-z_2|^2$. where $z_1,z_2\in S$ with $Re(z_1)>0$ and $Re(z_2)<0$, is ....

73. If the equation $|2x^3-15x^2+36x-30|=\lambda,\ \lambda\in R$ has 4 solution, for $\lambda\in(\alpha,\beta)$, then the value of $(\alpha+\beta)$ is –

74. A differentiable function f is satisfying the relation

$$f(x+y)=f(x)+f(y)+2xy(x+y)-\frac{1}{3},\ \forall x,y\in R$$

and $\lim_{h\to 0}\frac{3f(h)-1}{6h}=\frac{2}{3}$, then value of $\left[f(2)\right]$ is (where [ ] denotes greatest integer function)

75. An isosceles triangle that can be inscribed in an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ having its one vertex coincident with one extremity of major axis has the maximum area equal to $\frac{m\sqrt{n}}{4}ab$ (m, n are prime numbers) then $\frac{m^3-n}{2}=$

KEY SHEET

PHYSICS

1	**C**	2	**A**	3	**C**	4	**B**	5	**C**
6	**B**	7	**B**	8	**D**	9	**C**	10	**B**
11	**C**	12	**A**	13	**C**	14	**A**	15	**B**
16	**B**	17	**A**	18	**B**	19	**B**	20	**C**
21	**2**	22	**3**	23	**12**	24	**3**	25	**7**

CHEMISTRY

26	**B**	27	**C**	28	**A**	29	**D**	30	**B**
31	**D**	32	**C**	33	**B**	34	**A**	35	**B**
36	**B**	37	**A**	38	**C**	39	**B**	40	**C**
41	**B**	42	**D**	43	**C**	44	**D**	45	**A**
46	**12**	47	**110**	48	**7**	49	**80**	50	**665**

MATHEMATICS

51	**C**	52	**D**	53	**D**	54	**B**	55	**C**
56	**B**	57	**D**	58	**A**	59	**B**	60	**C**
61	**D**	62	**A**	63	**C**	64	**D**	65	**C**
66	**C**	67	**D**	68	**B**	69	**B**	70	**A**
71	**4**	72	**8**	73	**5**	74	**8**	75	**12**