FIITJEE – JEE (Main)

Batches: 12th Studying & 12th Pass
PHYSICS, CHEMISTRY & MATHEMATICS
Mock Test – I
QP Code:

Time Allotted: 3 Hours **Maximum Marks: 300**

- Do not open this Test Booklet until you are asked to do so.
- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

Important Instructions:

A. General Instructions

1. Immediately fill in the particulars on this page of the Test Booklet with *Blue / Black Ball Point Pen. Use of pencil is strictly prohibited.*
2. The Answer Sheet is kept inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of 75 questions. The maximum marks are 30**0**.
5. This question paper contains **Three Parts**.
6. Part-**I** is Physics, Part-**II** is Chemistry and Part-**III** is Mathematics.
7. Each Part has only one section: Section - A.
8. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
9. Blank Papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.
10. Use ***Blue / Black Ball Point Pen only*** for writing particulars / marking responses on ***Side-1*** and ***Side-2*** of the Answer Sheet. ***Use of pencil is strictly prohibited.***
11. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. except the Admit Card inside the examination hall / room.
12. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room / Hall. ***However, the candidates are allowed to take away this Test Booklet with them.***
13. **Do not fold or make any stray marks on the Answer Sheet.**

B. Marking Scheme For All Three Parts.

(i) **Section-A (01 – 20, 26 – 45, 51 – 70)** *contains 60 multiple choice questions which have* ***only one correct answer****. Each question carries* ***+4 marks*** *for correct answer and* ***–1 mark*** *for wrong answer.*

Section-A (21 – 25, 46 – 50, 71 – 75) *contains 15* Numerical based questions, the answer of which maybe positive or negative numbers or decimals and each question carries **+4 marks** for correct answer. **There is no negative marking.**

Name of the Candidate (in Capital Letters) :_____

Enrolment Number :_____

Batch :_____ **Date of Examination :** _____

PART – I: PHYSICS

Section – A: Single Correct Answer Type

This section contains **20 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE is correct.**

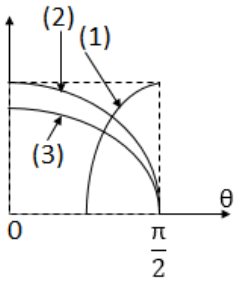
1. A car accelerates from rest at a constant rate α for some time, after which it decelerates at a constant rate β to come to rest. If the total time elapsed is t, the maximum velocity attained by the car is given by

(A) $\left[\frac{\alpha\beta}{\alpha+\beta}\right]t$ (B) $\left[\frac{\alpha+\beta}{\alpha\beta}\right]t$ (C) $\left[\frac{\alpha^2+\beta^2}{\alpha\beta}\right]t$ (D) $\left[\frac{\alpha^2-\beta^2}{\alpha\beta}\right]t$

2. Vectors 'a' and 'b' include an angle θ between them. If (a + b) and (a – b) respectively subtend angles α and β with 'a', then $(\tan\alpha+\tan\beta)$ is

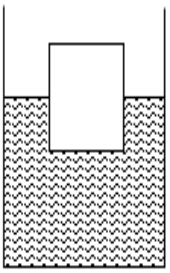
(A) $\frac{ab\sin\theta}{a^2+b^2\cos^2\theta}$ (B) $\frac{2ab\sin\theta}{a^2-b^2\cos^2\theta}$ (C) $\frac{a^2\sin^2\theta}{a^2+b^2\cos^2\theta}$ (D) $\frac{b^2\sin^2\theta}{a^2-b^2\cos^2\theta}$

3. A block of mass m is placed on an inclined plane with the angle of inclination θ. Let N, f_L and F respectively represent the normal reaction, limiting force of friction and the net force down the inclined plane. Let μ be the coefficient of friction. The dependence of N, f_L and F on θ is indicated by plotting graphs as shown below. Then curve (1), (2) and (3) respectively represent



(A) N, F and f_L (B) F, f_L and N
(C) F, N and f_L (D) f_L, N and F

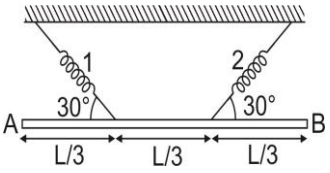
4. A cubical block is in a floating equilibrium in a liquid with half of its volume submerged as shown in the figure at temperature T.



$\alpha_s \rightarrow$ coefficient of linear expansion of block
$\gamma_L \rightarrow$ coefficient of volume expansion of liquid
$\rho_s \rightarrow$ density of block at temperature T
$\rho_L \rightarrow$ density of liquid at temperature T
If the depth of the block submerged in the liquid does not change on increasing temperature, then ratio of α_s to γ_L is

(A) ½ (B) 3
(C) 2 (D) 1

5. A uniform slender rod AB of mass m is suspended from the two identical springs as shown. The accleration of point B immediately after spring (2) is cut is:

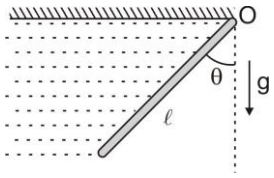


(A) $-\left(\frac{\sqrt{3}}{2}g\hat{i}+g\hat{j}\right)m/s^2$ (B) $\left(\frac{\sqrt{3}}{2}g\hat{i}+g\hat{j}\right)m/s^2$

(C) $\frac{\sqrt{3}}{2}g\hat{j}\ m/s^2$ (D) $-\frac{\sqrt{3}}{2}g\hat{j}\ m/s^2$

Space for rough work

6. A rod of mass m and length ℓ is hinged at O so that it can rotate freely in the vertical plane about O. A soap film is formed between the rod and support wall as shown in the figure. If the rod is in equilibrium, the value of surface tension of the liquid is:



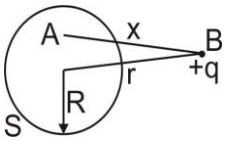
(A) $\frac{mg}{2\ell\sin\theta}$ (B) $\frac{mg\sin\theta}{\ell}$

(C) $\frac{mg\sin\theta}{2\ell}$ (D) $\frac{mg}{\ell\sin\theta}$

7. A stone of weight W is thrown vertically upwards into air with an initial velocity v_0. If a constant force F due to air drag acts on the stone throughout its motion, the speed of the stone upon impact with the ground is

(A) $v_0\left(\frac{W+F}{W-F}\right)^{1/2}$ (B) $v_0\left(\frac{W-F}{W+F}\right)^{1/2}$ (C) $\frac{v_0}{2}\left(\frac{W}{F}\right)^{1/2}$ (D) $v_0\left(\frac{F}{W}\right)^{1/2}$

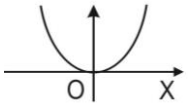
8. An uncharged metallic hollow sphere 'S' of radius R is held fixed. A point charge 'q' is kept at B which is at a distance 'r' from the centre of the shell. The magnitude of electric field at point A due to the induced charges on the shell is

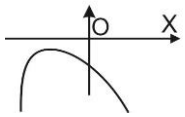


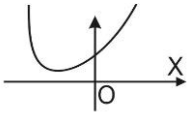
(A) $\frac{kq}{r^2}$ (B) $\frac{kq}{x^2}$

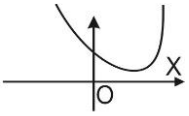
(C) $kq\left(\frac{1}{r^2}-\frac{1}{x^2}\right)$ (D) none of these

9. Two very long straight parallel wires, parallel to y-axis, carry currents $4I$ and I, along +y direction and -y direction, respectively. The wires are passes through the x-axis at the points (d, 0,0) and (- d, 0,0) respectively. The graph of magnetic field z-component as one moves along the x-axis from $x=-d$ to $x=+d$, is best given by

(A) 

(B) 

(C) 

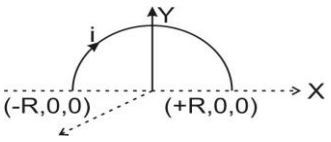
(D) 

10. A charged particle moves in a magnetic field $\vec{B}=10\hat{i}$ with initial velocity $\vec{u}=5\hat{i}+4\hat{j}$. The path of particle is

(A) straight line (B) circle (C) helical (D) none

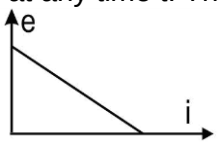
Space for rough work

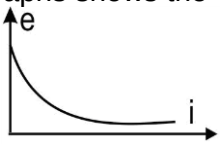
11. A semi circular current carrying wire having radius R is placed in x-y plane with its centre at origin 'O'. There is non-uniform magnetic field $\vec{B} = \frac{B_0 x}{2R}\hat{k}$, (where B_0 is a positive constant) existing in the region. The magnetic force acting on semi circular wire will be along

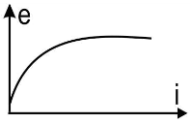


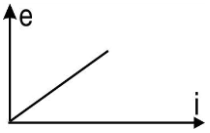
(A) negative x – axis
(B) positive y – axis
(C) negative y – axis
(D) positive x – axis

12. In an L-R circuit connected to a battery of constant e.m.f. E. Switch S is closed at time t = 0. If e denotes the magnitude of induced e.m.f. across inductor and i the current in the circuit at any time t. Then which of the following graphs shows the variation of e with i?

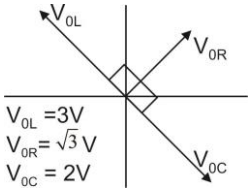
(A) 

(B) 

(C) 

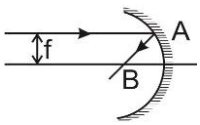
(D) 

13. The given figure represents the phasor diagram of a series LCR circuit connected to an ac source. At the instant t' when the source voltage is given by $V = V_0 \cos \omega t$, the current in the circuit will be



(A) $I = I_0 \cos\left(\omega t + \frac{\pi}{6}\right)$
(B) $I = I_0 \cos\left(\omega t - \frac{\pi}{6}\right)$
(C) $I = I_0 \cos\left(\omega t + \frac{\pi}{3}\right)$
(D) $I = I_0 \cos\left(\omega t - \frac{\pi}{3}\right)$

14. A ray of light is incident on a concave mirror. It is parallel to the principal axis and its height from principal axis is equal to the focal length of the mirror. The ratio of the distance of point B to the distance of the focus from the centre of curvature is (AB is the reflected ray)



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

Space for rough work

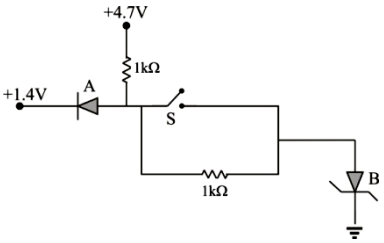
15. It is desired to make an achromatic combination of two lenses (L_1 and L_2) made of materials having dispersive powers ω_1 and ω_2 ($< \omega_1$). If the combination of lenses is converging then
(A) L_1 is converging
(B) L_2 is converging
(C) Power of L_1 is greater than the power of L_2
(D) None of these

16. A composition string is made up by joining two strings of different masses per unit length, μ and 4μ. The composite string is under the same tension. A transverse wave pulse: Y = (6 mm) sin(5t + 40x), where 't' is in seconds and 'x' in meters, is sent along the lighter string towards the joint. The joint is at x = 0. The equation of the wave pulse reflected from the joint is
(A) (2 mm) sin(5t – 40x) (B) (4mm)sin(40x – 5t)
(C) (2mm) sin(5t – 10x) (D) –(2 mm) sin(5t – 40x)

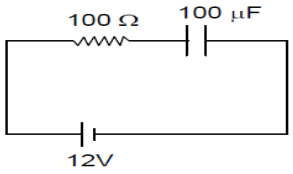
17. An electron in hydrogen atom after absorbing energy photons can jump between energy states n_1 and n_2 ($n_2 > n_1$). Then it may return to ground state after emitting six different wavelengths in emission spectrum. The energy of emitted photons is either equal to, less than or greater than the absorbed photons.
(A) $n_2 = 4$, $n_1 = 3$ (B) $n_2 = 5$, $n_1 = 3$
(C) $n_2 = 4$, $n_1 = 2$ (D) $n_2 = 4$, $n_1 = 1$

18. In a certain system of units, 1 unit of time is 5 sec, 1 unit of mass is 20 kg and unit of length is 10 m. In this system, one unit of power will correspond to
(A) 16 watts (B) 1/16 watts (C) 25 watts (D) none of these

19. In the circuit given, A is a Germanium diode (forward bias voltage is 0.3 volts) while B is Silicon zener diode (forward bias voltage is 0.7 volts). If the switch S is open, then values of I_A and I_B are given by (here I_A & I_B are current flowing through diode A and B)
(A) 3 mA, 2 mA (B) 1 mA
(C) 4 mA, 2mA (D) 2mA, 1mA



20. The value of displacement current at t = 1 time constant is
(A) $\frac{120}{e}$ mA (B) $\frac{120}{e^2}$ mA
(C) 120 mA (D) None of these



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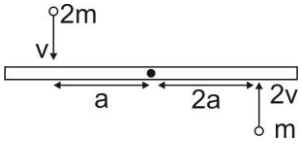
Section – A
Numerical based questions

21. A uniform bar of length 6a and mass 8m lies on a smooth horizontal surface. Two point masses m and 2m are moving in the same horizontal plane with speed 2v and v respectively, strike the bar and stick to it after collision. Then, the angular velocity of the system about centre of mass of the system just after collision is $n\left(\frac{v}{6a}\right)$. Find n.

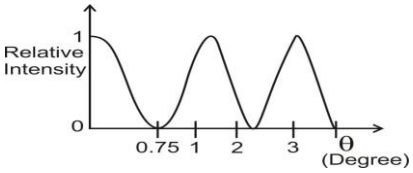


22. The electric field strength depends only on the x and y coordinates according to $\vec{E} = a\left(\frac{x\hat{i} + y\hat{j}}{x^2 + y^2}\right)$, 'a' being a constant. The flux of the vector $\vec{E}$ through a sphere of radius R with its centre at the origin of co-ordinates is $\frac{n}{2}\pi Ra$. Find n.

23. A sphere is dropped under gravity through a fluid of viscosity η. If the average acceleration is half of the initial acceleration, the time to attain the terminal velocity is $\frac{2}{n}\left(\frac{\rho r^2}{\eta}\right)$. Find n. (p = density of sphere; r = radius).

24. A satellite is seen after every 6 hours over the equator. It is known that it rotates opposite to that of earth's direction. Then the angular velocity of the satellite about the centre of earth will be $\frac{\pi}{n}$ rad/hr. Find n.

25. Light of wavelength 520 nm passing through a double slit, produces interference pattern of relative intensity versus deflection angle θ as shown in the figure. The separation d between the slits is $n \times 10^{-2}$ mm. Find n (nearest integer).



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PART – II: CHEMISTRY

Section – A: Single Correct Answer Type

This section contains **20 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE is correct.**

1.1126. The ratio of the de Brogle wavelength of a proton and an α-particle will be 1:2 if their
(A) velocity are in the ratio 1:8 (B) velocity are in the ratio 8:1
(C) kinetic energy are in the ratio 1:64 (D) kinetic energy are in the ratio1:256

27. If $\Delta_f H^{\Theta}$ of ICl(g), Cl(g) and I(g) are 17.57, 121.34 and 106.96 J mol^{-1}, respectively, then bond dissociation energy of I-Cl bond is
(A) 35.15J mol^{-1} (B) 106.69 J mol^{-1} (C) 210.73 J mol^{-1} (D) 420.9 J mol^{-1}

28. 20mL of M/10 CH_3COOH solution is titrated with M/10 NaOH solution. After addition of 16mL solution of NaOH, what is the pH of the solution? (pK_a=4.74)
(A) 5.05 (B) 4.15 (C) 4.75 (D) 5.35

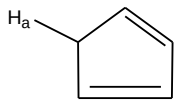
29. Given the ionic equivalent conductivities for the following ions:
$\lambda^{\circ}_{eq}K^{\oplus} = 73.5 cm^2\, ohm^{-1} eq^{-1}$; $\lambda^{\circ}_{eq}Al^{3+} = 149 cm^2\, ohm^{-1} eq^{-1}$; & $\lambda^{\circ}_{eq}SO_4^{2-} = 85.8 cm^2\, ohm^{-1} eq^{-1}$
The Λ°_{eq} for potash alum ($K_2SO_4.Al_2(SO_4)_3.24H_2O$) in cm^2 ohm^{-1} eq^{-1} is:
(A) 215.92 (B) 348.3 (C) 368.2 (D) 108.52

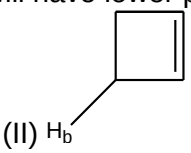
30. Aluminium hydroxide forms a positively charged sol. Which of the following ionic substances should be most effective in coagulating the sol?
(A)NaCl (B) $CaCl_2$ (C) $Fe_2(SO_4)_3$ (D) K_3PO_4.

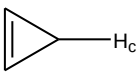
31. The reaction $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ is first order with respect to N_2O_5. Which of the following graphs would yield a straight line?
(A) $\log p_{N_2O_5}$ vs time with –ve slope (B) $\left(p_{N_2O_5}\right)^{-1}$ vs time
(C) $p_{N_2O_5}$ vs time (D) $\log p_{N_2O_5}$ vs time with +ve slope.

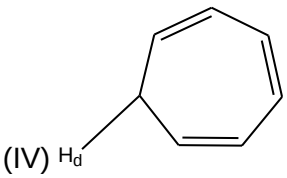
32. Which ion has the highest value of spin magnetic moment?
(A) Fe^{2+} (B) Co^{2+} (C) Mn^{2+} (D) Zn^{2+}

33. Reaction of which of the following salt with dil. HCl or dil.H_2SO_4 produces a gas which acts both as oxidizing as well as reducing agent?
(A) Na_2CO_3 (B) Na_2SO_3 (C) Na_2S (D) Na_2SO_4

34. Which of the following will have lower pK_a value?
(I) 

(II) 

(III) 

(IV) 

(A) H_a (B)H_b (C)H_c (D)H_d

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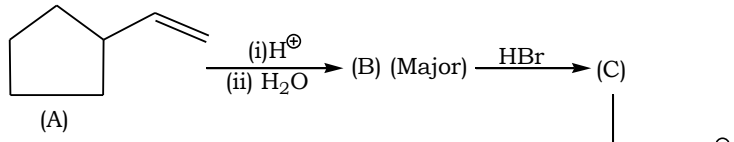
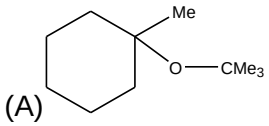
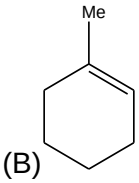
35.





(A)



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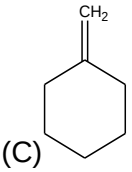
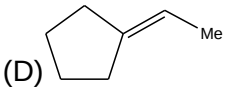


(C)



(D)

36. A compound has molecular formula $C_6H_{12}O$. It does not reduce Tollens or Fehling's reagent, but gives a crystalline derivative with 2,4-dinitrophenyl hydrazine. With alkali and I_2, it gives yellow solid with a medicinal odour. Clemmensen reduction converts it to 2-methylpentane. The structural formula of the compound is most likely

(A) $CH_3-COCH_2-CH\left(CH_3\right)_2$ (B) $CH_3-CH_2-CO-CH\left(CH_3\right)_2$

(C) $CH_3CH_2CH_2-CO-CH_2CH_3$ (D) $\left(CH_3\right)_2-CH-CO-CH\left(CH_3\right)_2$

37. The monomer of orlon is

(A) Vinyl cyanide (B) Isoprene (C) Glycol (D) Acrolein

38. Amoxillin is a semi-synthetic modification of

(A) Penicillin (B)Streptomycin (C) Tetracycline (D) Chloramphenicol

39. Which of the following has greatest affinity for heamoglobin?

(A) CO (B) N_2 (C) O_2 (D) CO_2.

40. Which has the most thermal stability?

(A) $CaCO_3$ (B) $CaSO_4$ (C) $Ca(NO_3)_2$ (D) $CaSO_3$

41. Which has maximum tendency to form stable compounds in the highest possible oxidation state of it's group?

(A) Pb (B) Tl (C) Bi (D) I

42. The melting point of transition metals mostly depend on

(A) crystal structure (B) Number of unpaired electrons

(C) ionization energy (D) atomic size

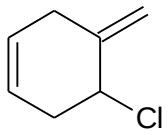
43. Which of the following compound is least reactive towards NBS/hν?

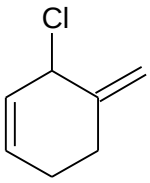
(A) $CH_3CH = CH_2$ (B) $CH_2 = CH - CH = CH_2$

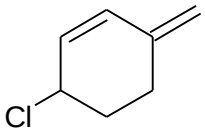
(C) $CH_3CH = CH - CH = CHCH_3$ (D) $CH_3CH = CHCH_3$

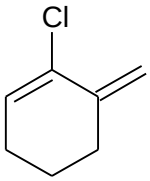
Space for rough work

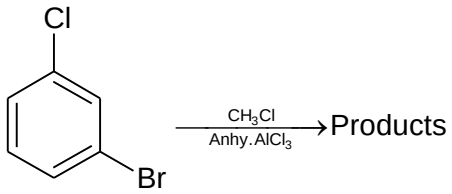
44. The most reactive alkyl halide towards aqueous KOH by S_N1 path is

(A) 

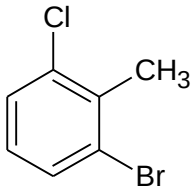
(B) 

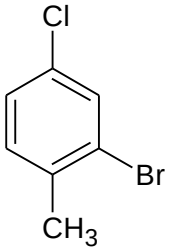
(C) 

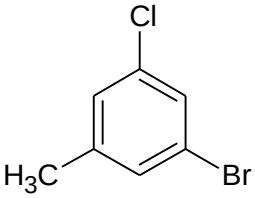
(D) 

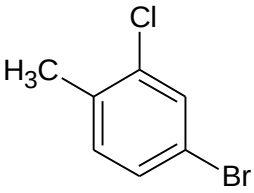
45. 

The major product is

(A) 

(B) 

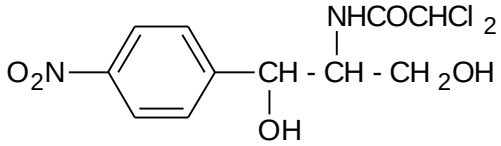
(C) 

(D) 

Section – A
Numerical based questions

46. How many species out of the given ones become(s) diamagnetic by gaining one electron?
$O_2^+, O_2^-, O_2^{2-}, O_2^{2+}, N_2^+, N_2^-, N_2^{2+}, N_2^{2-}, C_2^{2-}, C_2^-, C_2^{2+}, C_2^+$

Space for rough work

47. 

Above compound is a broad spectrum antibiotic which is known as chloramphenecol. Hydrolysis of chloramphenecol in acid or base medium forms dichloro acetic acid and compound(P) $C_9H_{12}N_2O_4$. Periodic oxidation of (P) with HIO_4 produces three products. One of them is an aromatic compound(Q). How many hydrogen atom(s) is/are present in (Q).

48. The formula of an octahedral complex of chromium(III) is $CrCl_3.(NH_3)_x$. Two moles of it is dissolved in one Kg water. The boiling point of the solution is found to be 101.872°C. if the degree of dissociation of the complex is 0.4, what is the formula mass of the complex ion in gram unit? [Atomic mass of Cr = 52] [K_b of H_2O = 0.52 K kg mol^{-1}]

49. $2XY_3(s) \rightleftharpoons X_2(s) + 3Y_2(g)$

If above reaction attains equilibrium at 3 atm and at a certain temperature. What will be the equilibrium constant in atm^3 unit?

50. The formula of alkyl silicon chloride for different types of silicones are given below.

For linear silicones $\rightarrow Si(R)_{m_1}(Cl)_{n_1}$

For cross-linked silicones $\rightarrow Si(R)_{m_2}(Cl)_{n_2}$

The sum of n_1 and n_2 is

space for rough work

PART – III: MATHEMATICS

Section – A: Single Correct Answer Type

This section contains **20 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE is correct.**

51. The sum of the distances of any point on the ellipse $3x^2 + 4y^2 = 12$ from its directrices is
(A) 4 (B) 8 (C) 12 (D) 16

52. The sum of first n terms of an arithmetic progression is cn(n –1), where $c \neq 0$. The sum of squares of these terms is
(A) $c^2n^2(n + 1)^2$ (B) $\frac{2}{3}$ c^2n (n –1) (2n –1)
(C) $\frac{2}{3}$ c^2n (n + 1) (2n + 1) (D) $\frac{1}{3}c^2n(n+1)(2n+1)$

53. The plane passing through the line 4x – 5y – 4z – 1 = 0 = 2x + y + 2z – 8 and the point (2, 1, 3) is
(A) 32x – 5y + 8z = 83 (B) 32x + 5y – 8z = 83
(C) 32x – 5y + 8z + 83 = 0 (D) None of these

54. Let $f(x) = \int_1^x \sqrt{2 - t^2}\,dt$. Then the real roots of the equation $x^2 - f'(x) = 0$ are
(A) $0, \pm 1$ (B) $\pm \frac{1}{\sqrt{2}}$ (C) $\pm \frac{1}{2}$ (D) ± 1

55. In a bag there are 15 red and 5 white balls. Two balls are to be chosen at random. If it so happens that the first one is red, then what would the probability be that the second one is also red
(A) 7/10 (B) 7/17 (C) 14/19 (D) 15/19

56. The number of solutions of $\log_4(x - 1) = \log_2(x - 3)$ is
(A) 3 (B) 1 (C) 2 (D) 0

57. f: [1, 10] $\rightarrow$ [1, 10] is a non-decreasing function and g: [1, 10] $\rightarrow$ [1, 10] is a non-increasing function.
Let h(x) = f(g(x)) be a continuous function such that h(1) = 1. Then h (2)
(A) lies in (1, 2) (B) is more than two
(C) is equal to one (D) is not defined

58. The coefficient of x^n in the polynomial ($x + {}^nC_0$) ($x + 3\,{}^nC_1$) ($x + 5\,{}^nC_2$) …….. ($x + (2n + 1)\,{}^nC_n$) is
(A) $n.2^n$ (B) $n.2^{n+1}$ (C) $(n+1).2^n$ (D) $n.2^n + 1$

Space for rough work

59. Consider a rectangle ABCD. Three, four, five and six points are marked respectively on the sides AB, BC, CD and DA (none of them being the vertex of the rectangle). Number of triangles that can be formed with these points as vertices, so that there is a most one angular point on any side is;
(A) 232 (B) 342 (C) 360 (D) none of these

60. The area (in sq. units) bounded by the curve $y = e^{|x|}$, $y = e^{-|x|}$, $x \geq 0$ and $x \leq 5$ is
(A) $e^5 + e^{-5} + 2$ (B) $e^5 + e^{-5} - 2$ (C) $e^5 - e^{-5} + 2$ (D) $e^5 - e^{-5} - 2$

61. Let $\vec{a} = 2\hat{i} + \hat{j} - 2\hat{k}$; $\vec{b} = \hat{i} + \hat{j}$ and $\vec{c}$ be a vector such that $\vec{a} \cdot \vec{c} = |\vec{c}|$, $|\vec{c} - \vec{a}| = 2\sqrt{2}$.
If angle between $(\vec{a} \times \vec{b})$ and $\vec{c}$ is 30°, then $\left|(\vec{a} \times \vec{b}) \times \vec{c}\right|$ =
(A) 2/3 (B) 3/2 (C) 2 (D) 3

62. If $\frac{\tan 3\theta}{\tan \theta} = 4$, then $\frac{\sin 3\theta}{\sin \theta}$ equals $\left(\theta \in \left(0, \frac{\pi}{2}\right) - \left\{\frac{\pi}{6}\right\}\right)$
(A) $\frac{3}{5}$ (B) $\frac{4}{5}$ (C) $\frac{3}{4}$ (D) none of these.

63. The differential equation $y \frac{dy}{dx} = a - x$ ($x \neq a$, $a \in R$) represents
(A) a family of circles with centre on y-axis (B) a family of circles with centre at origin
(C) a family of circles with given radius (D) a family of circles with centre on x-axis

64. The set of all $x \in R$ such that $\frac{\left(e^x - 1\right)\left(\ln\left(1 + x\right)\right)\left(3 - x\right)}{\left(x^2 - 4\right)} < 0$ is
(A) $(-\infty, -2) \cup (0, 2) \cup (3, \infty)$ (B) $(-1, 2) \cup (3, \infty)$
(C) $(-2, 2) \cup (3, \infty)$ (D) none of these

65. If $0 < \alpha < \frac{\pi}{4}$, then the equation $(x - \sin\alpha)(x - \cos\alpha) - 2 = 0$ has
(A) both roots in $(\sin\alpha, \cos\alpha)$
(B) both roots in $(\cos\alpha, \sin\alpha)$
(C) no real root
(D) one root in $(-\infty, \sin\alpha)$ and other in $(\cos\alpha, \infty)$

66. If the parabola $y = f(x)$, having axis parallel to y-axis, touch the line $y = x$ at (1, 1); then
(A) $f'(0) + 2f(0) = 0$ (B) $2f(0) + f'(0) = 1$
(C) $2f(0) - f'(0) = 1$ (D) $2f'(0) - f(0) = 1$

67. The value of $\tan\left[\cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{2}{3}\right)\right]$ =
(A) 6/17 (B) 7/16 (C) 16/7 (D) none of these

Space for rough work

68. Let $f : R \to R$, $f(x) = \begin{cases} |x-[x]|, & [x] \text{ is odd} \\ |x-[x+1]|, & [x] \text{ is even} \end{cases}$, where [.] denotes GIF, then $\int_{-2}^{4} f(x)dx =$

(A) 5/2 (B) 3/2 (C) 5 (D) 3

69. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & -2 & 4 \end{bmatrix}$, $I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and $A^{-1} = \left[\frac{1}{6}(A^2 + cA + dI)\right]$, then the value of c and d are

(A) - 6, -11 (B) 6, 11 (C) - 6, 11 (D) 6, - 11

70. If the truth value of statement 'p' is True and the truth value of statement 'q' is false then the truth value of $\sim p \wedge \sim q$ is

(A) True (B) False
(C) Cannot be determined (D) None of these

Section – A
Numerical based questions

71. The variance of 6, 8, 10, 12, 14 is

72. The number of complex numbers z satisfying $|z-3-i| = |z-9-i| = |z-3+3i|$ $\left(i = \sqrt{-1}\right)$ is

73. The number of values of 'p' such that circle $x^2 + y^2 + 2x + 4y - p = 0$ and the coordinate axes have exactly three points in common is

74. The value of $\lim_{x \to 0} \log_{\tan^2 x}\left(\tan^2 2x\right)$ is

75. If the function $f(x) = \begin{cases} x^2 + 3x + p & ,\text{if } x \le 1 \\ qx + 2 & ,\text{if } x > 1 \end{cases}$ is differentiable at x = 1 then the value of q – p is

Space for rough work

FIITJEE – JEE (Mains)

Batches: 12th Studying & 12th Pass

Mock Test – I

QP Code:

ANSWER KEY

SECTION – I (PHYSICS)

PART-A

1.	A	2.	B	3.	C	4.	A
5.	A	6.	C	7.	B	8.	B
9.	C	10.	C	11.	A	12.	A
13.	B	14.	A	15.	B	16.	D
17.	C	18.	A	19.	D	20.	A

PART-C

21.	1.2	22.	8	23.	4.5	24.	4
25.	2						

SECTION – II (CHEMISTRY)

PART-A

26.	B	27.	C	28.	D	29.	A
30.	D	31.	A	32.	C	33.	B
34.	A	35.	C	36.	A	37.	A
38.	A	39.	A	40.	B	41.	D
42.	B	43.	B	44.	C	45.	B

PART-C

46.	4	47.	5	48.	172.5	49.	27
50.	5						

SECTION – III (MATHEMATICS)

PART-A

51.	B	52.	B	53.	A	54.	D
55.	C	56.	B	57.	C	58.	C
59.	B	60.	B	61.	B	62.	D
63.	D	64.	D	65.	D	66.	B
67.	D	68.	D	69.	C	70.	B

PART-C

71.	8	72.	1	73.	2	74.	1
75.	2						