FIITJEE – JEE (Main)

Batches: 12th Studying & 12th Pass
PHYSICS, CHEMISTRY & MATHEMATICS
Mock Test – V
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 spherical shell of inner radius *a* and outer radius *b* is made of a material of resistivity ρ and negligible dielectric activity. A single point charge $q_0$is located at the center of the shell. At time t = 0 all of the material of the shell is electrically neutral, including both the inner and outer surfaces. What is the total charge on the outer surface of the shell as a function of time for t > 0? Ignore any effects due to magnetism or radiation; do not assume that b − *a* is small.

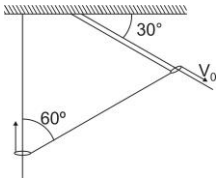
(A) $Q = q\left(1 - e^{-\frac{(b-a)t}{4\rho\pi ab\varepsilon_0}}\right)$ (B) $Q = q\left(1 - e^{-\frac{bt}{\rho a\varepsilon_0}}\right)$

(C) $Q = q\left(1 - e^{-\frac{(b-a)t}{\rho ab\varepsilon_0}}\right)$ (D) $Q = q\left(1 - e^{-\frac{t}{\rho\varepsilon_0}}\right)$

2. A particle executing SHM in a straight line with amplitude A and time period T. What is the maximum average speed of the particle during a time interval T/6?

(A) $\frac{9A}{2T}$ (B) $\frac{6A}{T}$ (C) $\frac{3A}{T}$ (D) $\frac{\sqrt{3}A}{2T}$

3. One end of a thread is connected at a point on a wall and other end is connected with a ring which is free to move over a vertical rod. In between the thread passes over another ring which is moved with a constant velocity v_0. Then the speed of the other ring is nv_0. Find n.

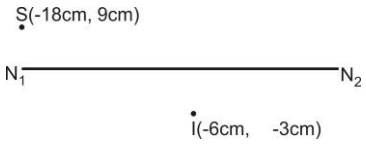


(A) 1 (B) 2 (C) 3 (D) 4

4. Three capacitors having capacitance 4,12,6 micro farad and break down voltage of 10V, 6V and 8V respectively are connected in series. What will be the break down voltage of the combined system

(A) 12V (B) 20V (C) 22V (D) 4V

5. Point I (-6cm,-3cm) is the true image of a point source of light S (-18cm,9cm) in a spherical mirror whose optical axis is N_1N_2 as shown in figure.. Find the radius of curvature of the mirror (in cm.).



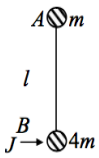
(A) 6cm. (B) 8cm. (C) 9cm. (D) 10cm.

Space for rough work

6. A light ray propagating along $\hat{a} = \frac{\hat{i}+\hat{j}-\hat{k}}{\sqrt{3}}$ is incident at Brewster's angle at a boundary with normal direction given by $\hat{n} = \frac{2\hat{i}-\hat{j}+2\hat{k}}{3}$. The electric field in the reflected light ray will be polarized along

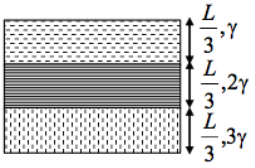
(A) $\frac{\hat{i}+4\hat{j}+3\hat{k}}{\sqrt{26}}$ (B) $\frac{\hat{i}-4\hat{j}-3\hat{k}}{\sqrt{26}}$ (C) $\frac{-\hat{i}+4\hat{j}-3\hat{k}}{\sqrt{26}}$ (D) none

7. An inextensible string connects two masses m and 4m and the system rests on a smooth horizontal floor. An impulse J is imparted to B as shown in figure. The tension in the string in the subsequent motion is



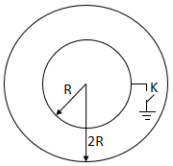
(A) $J^2/m\ell$ (B) $J^2/5m\ell$
(C) $4J^2/5m\ell$ (D) $J^2/20m\ell$

8. Three immiscible liquids are filled in a container as shown. The base area of the container is A and coefficient of cubical expansion of the material of the container is $3\gamma/2$ while the coefficient of cubical expansion of the liquids are shown in the figure. The temperature of the system is increased by $\triangle T$. The volume of the liquid flown out of the container is



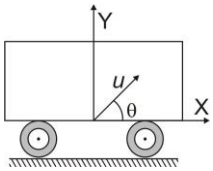
(A) $\frac{AL\gamma\triangle T}{3}$ (B) $\frac{3AL\gamma\triangle T}{5}$ (C) $\frac{2AL\gamma\triangle T}{3}$ (D) $\frac{AL\gamma\triangle T}{2}$

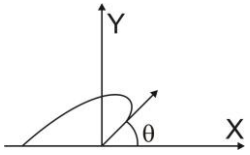
9. Figure shows two concentric shells. The capacitance of the system when switch K is open is C_1, capacitance on closing the switch is C_2. The ratio C_1/C_2 is

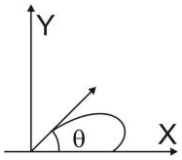


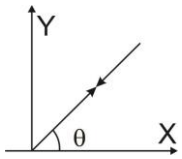
(A) $1:2$ (B) $2:1$
(C) $1:1$ (D) none

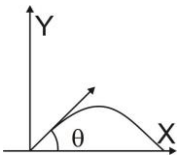
10. A train is moving with constant acceleration along the x axis. A particle is projected inside the train in a vertical plane containing the motion of train as shown. Which of the following cannot be the trajectory of the particle as observed from inside the train?



(A) 

(B) 

(C) 

(D) 

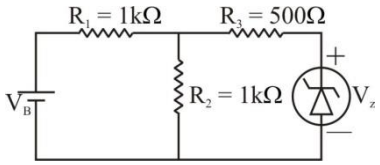
11. 8 identical spherical conducting droplets are charged to the same potential such that energy stored in the electric field of each is E_0. When they are mixed to form a large drop, the new energy stored in electric field is:

(A) 8 E_0 (B) 16 E_0 (C) 32 E_0 (D) 64 E_0

Space for rough work

12. The length of a rod is 5.88 cm (exact). It is measured by using a vernier calipers in which total length of 10 vernier space is equal to 8 main scale space. One division of a main scale is 1 mm. On putting the rod between the jaws of calipers, which line of vernier lies over any line of main scale.
(A) 4^{th} (B) 5^{th} (C) 8^{th} (D) 7^{th}

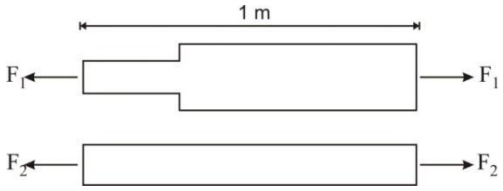
13. In the given circuit, the Zener- diode has breakdown voltage $V_z = 3$ Volt and the maximum power limit $P_{max} = 18$ mW. Choose the correct option.



(A) If V_B= 12 Volt, the power dissipated in Zener diode will exceed the minimum power limit, specified for it.
(B) If V_B = 12 volt, the power dissipated in Zener diode will not exceed the maximum power limit, specified for it.
(C) If V_B = 15 volt, the power dissipated in zener diode will exceed the maximum power limit, specified for it.
(D) If V_B = 20 volt, the power dissipated in zener diode will not exceed the maximum power limit, specified it.

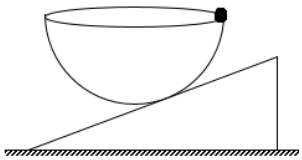
14. Two physical pendulums perform small oscillations about the same horiiontal axis with angular frequencies ω_1 and ω_2. Their moments of inertia relative to the given axis are equal to I_1 and I_2respectively. In a state of stable equilibrium the pendulums were fastened rigidly together. What will be the angular frequency of small oscillations of the compound pendulum?
(A) $\sqrt{\frac{I_1\omega_1+I_2\omega_2}{I_1+I_2}}$ (B) $\sqrt{\frac{I_1^2\omega_1+I_2^2\omega_2}{I_1+I_2}}$ (C) $\sqrt{\frac{I_1\omega_1^2+I_2\omega_2^2}{I_1+I_2}}$ (D) $\omega_1+\omega_2$

15. A rod of length 1 m and 10 cm^2 cross – sectional area for a portion of its length and 5 cm^2 for remaining length. It is pulled from both ends to develop stress in it. The strain energy in this stepped rod is 40% of that of the rod of 1 m length and uniform area of 10 cm^2 when subjected to same maximum stress in stepped rod. Find the length of portion of 10 cm^2 area in stepped bar.



(A) 0.1 m (B) 0.2 m (C) 0.3 m (D) 0.4 m

16. a solid hemisphere of weight W rests with its curved surface in contact with a rough inclined plane. A weight P is placed at some point on the rim of the hemisphere (refer diagram) to keep its plane surface horizontal. Find the friction coefficient between the hemisphere and the inclined plane, if the hemisphere is just in equlibrium.



(A) $\frac{P}{\sqrt{W(2P+W)}}$ (B) $\frac{W}{\sqrt{W(2P+W)}}$ (C) $\frac{P}{\sqrt{W(P+W)}}$ (D) $\frac{W}{\sqrt{W(P+W)}}$

Space for rough work

17. A sound wave of frequency f travels horizontally to the right. It is reflected from a large vertical plane surface moving to the left with a speed v_0. The speed of sound in the medium is v. Choose the correct statement.

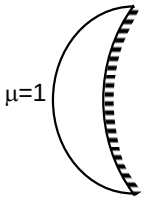
(A) The number of waves striking the surface per second is $\left(\frac{v+v_0}{v}\right)f$

(B) The wavelength of the reflected wave is $\left(\frac{v+v_0}{v-v_0}\right)f$

(C) The frequency of the reflected wave is $2\left(\frac{v+v_0}{v-v_0}\right)f$

(D) The number of beats heard by a stationary listener to the left of the reflecting surface is $\left(\frac{v_0}{v-v_0}\right)f$

18. A thin concavo-convex lens of glass (μ = 3/2) is silvered from concave side. The radii of curvature of the two surfaces are 40 cm and 20 cm. This combination will behave as



(A) a convex mirror (B) a concave mirror
(C) a plane mirror (D) can not be determined

19. Two identical capacitors have the same capacitance C. One of them is charged to potential V_1 and the other to V_2. The negative ends of the capacitors are connected together. When the positive ends are also connected, the decrease in energy of the system is:

(A) $\frac{1}{4}C\left(V_1^2-V_2^2\right)$ (B) $\frac{1}{4}C\left(V_1^2+V_2^2\right)$ (C) $\frac{1}{4}C\left(V_1-V_2\right)^2$ (D) $\frac{1}{4}C\left(V_1+V_2\right)^2$

20. The time taken by a particle to move down a straight tunnel from the surface of earth to its centre is _____ [R is radius of earth]

(A) $\frac{\pi}{2}\sqrt{\frac{R}{g}}$ (B) $\pi\sqrt{\frac{R}{g}}$ (C) $\frac{\pi}{4}\sqrt{\frac{R}{g}}$ (D) $\frac{2}{\sqrt{3}}\pi\sqrt{\frac{R}{g}}$

Section – A
Numerical based questions

21. When the temperature of a black body increases, it is observed that the wavelength corresponding to maximum energy changes from 0.26 μm to 0.13 μm. The ratio of emissive powers of the body at the respective temperature is

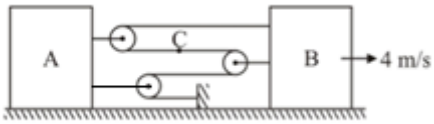
Space for rough work

22. Two balls A and B, each of mass m, are attached rigidly to the ends of a light rod of length d. The structure rotates about the perpendicular bisector of the rod at an angular speed ω. The angular momentum of the system about the axis of rotation is x times of $m\omega d^2$, where 'x' is

23. A uniform rod of mass m and length ℓ hinged at its end is released from rest when it is in horizontal position. The normal reaction at the hinge when the rod becomes vertical is x times of mg.

24. The wavelength of K_α line from an element of atomic number 51 is λ. For another element the wavelength of K_α line is 4λ. If the atomic number of the second element is 'y' then $\frac{y+4}{10}$ is

25. Find velocity of point C in the given figure.



Space for rough work

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.**

26 For the real gases reaction $2CO(g)+O_2(g)\rightarrow 2CO_2(g);\Delta H=-560kJ$. In 10 litre rigid vessel at 500 K the initial pressure is 70 bar and after the reaction it becomes 40 bar. The change in internal energy is :
(A)–557 kJ (B) –530 kJ (C) –563 kJ (D) –550 kJ

27 A_3B_2 is a sparingly soluble salt of molar mass $M\left(g\ mol^{-1}\right)$ and solubility x g litre^{-1}. The ratio of the molar concentration of B^{3-} to the solubility product of the salt is:
(A) $\frac{108}{1}\frac{x^5}{M^5}$ (B) $\frac{1}{108}\frac{M^4}{x^4}$ (C) $\frac{1}{54}\frac{M^4}{x^4}$ (D) $108\ \frac{108}{1}\frac{M^4}{x^4}$

28 A crystal is made of particle X,Y and Z. X forms fcc packing. Y occupies all the octahedral voids of X & Z occupies all the tetrahedral voids of X . If all the particle along one body diagonal are removed then the formula of the crystal would be:
(A) XYZ_2 (B) X_2YZ_2 (C) $X_8Y_4Z_5$ (D) $X_5Y_4Z_8$

29 Total vapour pressure of mixture of 1 mol $X\left(P_X^\circ=150\ torr\right)$ and 2 mol $Y\left(P_Y^\circ=300torr\right)$ is 240 torr. In this case:
(A) There is a negative deviation from Raoult's law
(B) There is a positive deviation from Raoult's law
(C) There is no deviation from Raoult's law
(D) Cannot be decided

30 A 250.0 mL sample of a 0.20 M Cr^{3+} is electrolysed with a current of 96.5 A. If the remaining $[Cr^{3+}]$ is 0.1 M , the duration of process is:
(A) 25 sec (B) 225 sec (C) 150sec (D) 75 sec

31 When ethyl acetate was hydrolysed in presence of 0.1 M HCl, the rate constant was found to be $5.4\times10^{-5}s^{-1}$. But in pressure of 0.1 M H_2SO_4 the rate constant was found to be $6.25\times10^{-5}s^{-1}$. Thus it may be concluded that:
(A) H_2SO_4 furnishes more H^+ than HCl
(B) H_2SO_4 furnishes less H^+ than HCl
(C)both have the same strength
(D) Will depend on concentration of ethyl acetate

Space for rough work

32 Identify the correct statement regarding enzymes:
(A) Enzymes are specific biological catalysts that normally works at high temperature
(B) Enzymes are normally heterogeneous catalysts which decress the reaction rate
(C) Enzymes are specific biological catalysts that are very specific in nature
(D) Enzymes are specific biological catalysts with low molar masses

33 Which of the following overlapping is not present in XeO_3 molecule?
(A) $sp^3 + p_x$ (B) $sp^3 + p_y$ (C) $d_{xz} + p_x$ (D) $sp^3 + s$

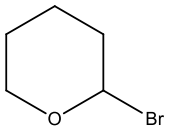
34 Which is not obtained when metal carbides react with H_2O?
(A) $Al_4C_3 + H_2O \longrightarrow CH \equiv CH$
(B) $CaC_2 + H_2O \longrightarrow CH \equiv CH$
(C) $Mg_4C_3 + H_2O \longrightarrow CH_3C \equiv CH$
(D) $Be_2C + H_2O \longrightarrow CH_4$

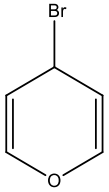
35 What is the magnetic moment (spin only) and hybridization of the brown ring complex $[Fe(H_2O)_5NO]SO_4$.?
(A) $\sqrt{3}BM, sp^3d^2$ (B) $\sqrt{3}BM, d^2sp^3$ (C) $\sqrt{15}BM, sp^3d^2$ (D) $\sqrt{15}BM, d^2sp^3$

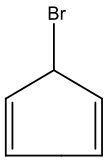
36 Salt (A) gives brick red fumes (B) with conc. H_2SO_4 and $K_2Cr_2O_7$ which gives yellow solution (C)with NaOH and it gives yellow ppt. (D) with acetic acid and lead acetate. What is(C)?
(A) Na_2CrO_4 (B)CrO_2Cl_2 (C)$PbCrO_4$ (D)NaCl

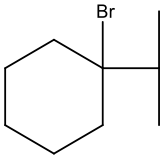
37. The method of zone refining of metals is based on the principle of:
(A)Greater mobility of the pure metal than that of impurity
(B) Higher melting point of the impurity than that of the pure metal
(C)Greater noble character of the solid metal than that of the impurity
(D)Greater solubility of the impurity in the molten state than in the solid.

38. Among the following which is more reactive toward $AgNO_3$?

(A) 

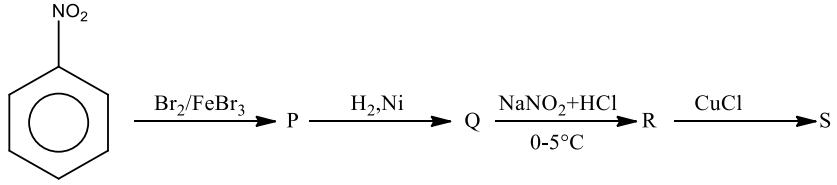
(B) 

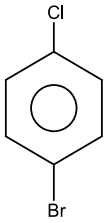
(C) 

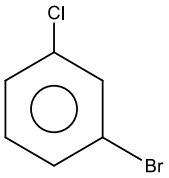
(D) 

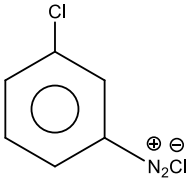
Space for rough work

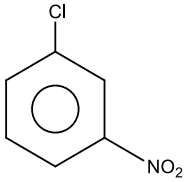
39. Consider the following reactions,

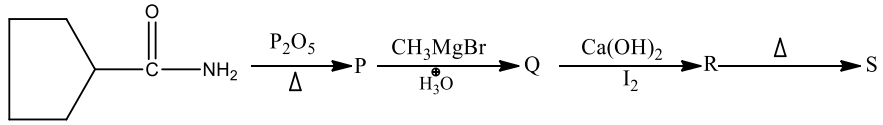


(A) 

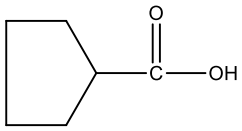
(B) 

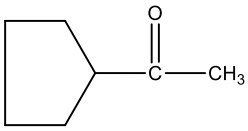
(C) 

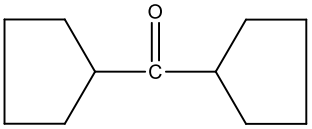
(D) 

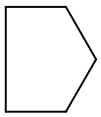
40 

S will be:

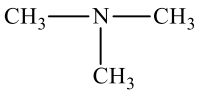
(A) 

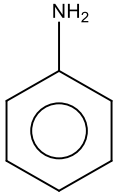
(B) 

(C) 

(D) 

41 Which of the following is most reactive amine towards dilute aqueous hydrochloric acid?

(A) $CH_3 - NH_2$ (B) $CH_3 - NH - CH_3$ (C) 

(D) 

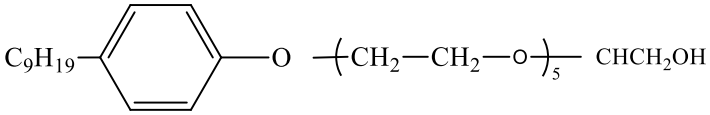
42 Dinuclecotide is obtained by joining two nucleotides together by phosphodiester linkage . Between which carbon atom of pentose sugar nucleotides are these linkages present?
(A) 5^1 and 3^1 (B) 1^1 and 5^1 (C) 5^1 and 5^1 (D) 5^1 and 1^1

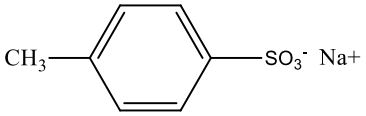
43 Which of the following polymers do not have vinylic monomer units?
(A) Acrilan (B) Polystyrene (C) Nylon (D) Teflon

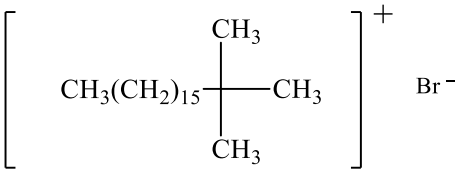
Space for rough work

44 Which of the following in an example of liquid dishwashing

(A) $CH_3(CH_2)_{10} - CH_2OSO_3^-Na^+$

(B) 

(C) 

(D) 

45 Which of the following statements is correct?
(A) ozone hole is a hole formed in stratosphere from which ozone oozes out
(B) Ozone hole is a hole formed in troposphere from which ozone oozes out
(C)Ozone hole is thinning of ozone layer of stratosphere at some places
(D)Ozone hole means vanishing of ozone layer around the earth completely

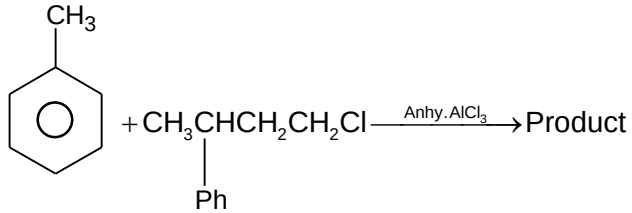
Section – A
Numerical based questions

46 100 mL of H_2SO_4 solution having molarity 1M and density 1.5 g/mL is mixed with 400 mL of water. Calculate final molarity of H_2SO_4 solution, If final density is 1.25 g/mL:

47 Enthalpy of neutralization of H_3PO_3 acid is –106.68 kJ/mol using NaOH. Enthalpy of neutralization of HCl by NaOH is –55.84kJ/mol. Calculate $\Delta H_{ionization}$ of H_3PO_3 into its ions:

48 $I_2(aq) + I^-(aq) \rightleftharpoons I_3^-(aq)$ we started with 1 mole of I_2 and 0.5 mole of I^- in one litre flask After equilibrium is reached, excess of $AgNO_3$ gave 0.25 mole of yellow precipitate Equilibrium constant is

49. A low pressure, if $RT = 2\sqrt{a.p}$, then the volume occupied by a real gas is $\frac{RT}{xP}$. Find the value of x

50. 

If the sum of the total number of ortho and para substituted product formed in the above reaction is given by X, then $\frac{X}{2}$ is: (Consider stereoisomers)

space for rough work

PART – III: MATHEMATICS

Section – A: Single Correct Answer Type

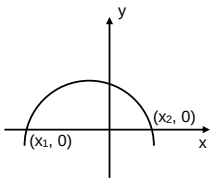
This section contains **20 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE is correct.**

51. If the derivative of a everywhere continuous function f(x) w.r.t. x is $\frac{\frac{1}{2}-\sin^2 x}{f(x)}$, then the period of f(x), if f(x) is a periodic function, is
(A) π (B) 2π (C) $\pi/2$ (D) none of these.

52. The total number of terms in the expansion of $(x + y)^{100} + (x – y)^{100}$ after simplification is
(A) 50 (B) 51 (C) 202 (D) none of these

53. The equation of the circle having its centre on the line $x + 2y – 3 = 0$ and passing through the point of intersection of the circles $x^2 + y^2 – 2x – 4y + 1 = 0$ and $x^2 + y^2 – 4x – 2y + 1 = 0$ is
(A) $x^2 + y^2 – 6x + 1 = 0$ (B) $x^2 + y^2 – 3x + 4 = 0$
(C) $x^2 + y^2 – 4x – 2y + 1 = 0$ (D) $x^2 + y^2 + 2x – 4y + 4 = 0$

54. The diagram shows the graph of $y = ax^2 + bx + c$, then
(A) $a < 0, b > 0$ (B) $c < 0, a < 0$
(C) $b < 0, c > 0$ (D) none of these



55. If $\vec{a}$ and $\vec{b}$ are two unit vectors and θ is the angle between them, then a unit vector along the angular bisector of $\vec{a}$ and $\vec{b}$ will be given by

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

56. If t_1 and t_2 be the parameters of extremities of a focal chord of the parabola $y^2 = 4ax$, a > 0, then the equation $t_1x^2 + ax + t_2 = 0$ has
(A) imaginary roots, (B) both roots positive
(C) one positive and one negative roots (D) both roots negative

57. Let 'E' and 'F' be two independent events. The probability that both 'E' and 'F' happen is 1/12 and the probability that neither 'E' nor 'F' happens is 1/2, then ,
(A) $P(E) = 1/3, P(F) = 1/4$ (B) $P(E) = 1/2, P(F) = 1/6$
(C) $P(\bar{E}) = 1/6, P(\bar{F}) = 1/2$ (D) $P(\bar{E}) = 1/4, P(\bar{F}) = 1/3$

Space for rough work

58. The general solution of the equation $\frac{1-\sin x+\sin^2 x-.....+\infty}{1+\sin x+\sin^2 x+.....+\infty}=\frac{1-\cos 2x}{1+\cos 2x}$ is x =

(A) $(-1)^n \frac{\pi}{3}+n\pi$ (B) $(-1)^n \frac{\pi}{6}+n\pi$

(C) $(-1)^{n+1} \frac{\pi}{6}+n\pi$ (D) $(-1)^{n-1} \frac{\pi}{3}+n\pi \quad (n \in I)$

59. If $\begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix}$ = x + iy, then

(A) x = 3, y = 1 (B) x = 1, y = 3 (C) x = 0, y = 3 (D) x = 0, y = 0

60. The value of $\int_{-\pi/4}^{\pi/4} \frac{dx}{\sec^2 x(1+\sin x)}$ is

(A) $\frac{\pi}{4}$ (B) π (C) $\frac{\pi}{2}$ (D) 2π

61. The equation $2\cos^{-1} x=\sin^{-1}\left(2x\sqrt{1-x^2}\right)$ is valid for all values of x satisfying

(A) $-1 \le x \le 1$ (B) $0 \le x \le 1$ (C) $0 \le x \le \frac{1}{\sqrt{2}}$ (D) $\frac{1}{\sqrt{2}} \le x \le 1$

62. If the equation $3x^2 + xy - y^2 - 3x + 6y + 2 = 0$ represents hyperbola then equation of the asymptotes is given by

(A) $3x^2 + xy - y^2 - 3x + 6y - 9 = 0$ (B) $3x^2 + xy - y^2 - 3x + 6y - 7 = 0$

(C) $3x^2 + xy - y^2 - 3x + 6y = 0$ (D) none of these

63. If $f(x)=\begin{cases} 2+x; & x \ge 0 \\ 2-x; & x<0 \end{cases}$; then f(f(x)) is given by

(A) $\begin{cases} 2+x, & x \ge 0 \\ 2-x, & x<0 \end{cases}$ (B) $\begin{cases} 4+x, & x \ge 0 \\ 4-x, & x<0 \end{cases}$ (C) $\begin{cases} 4-x, & x \ge 0 \\ 4+x, & x<0 \end{cases}$ (D) $\begin{cases} 2-x, & x \ge 0 \\ 2+x, & x<0 \end{cases}$

64. The minimum value of $\frac{1}{-2\sin x-2\sqrt{3}\cos x+6}$ is equal to

(A) $-\frac{1}{10}$ (B) $-\frac{1}{\sqrt{3}}$ (C) $\frac{1}{10}$ (D) $\frac{1}{6}$

65. If z_1, z_2, z_3 be the vertices of Δ ABC such that $\frac{AB}{AC}=2$ and $\angle A=\frac{\pi}{3}$, then which of the following is always true.

(A) $\frac{z_2-z_1}{z_3-z_1}=1+i\sqrt{3}$ (B) $\frac{z_2-z_1}{z_3-z_1}=1-\sqrt{3}i$ (C) $\left|\frac{z_2-z_1}{z_3-z_1}\right|=2$ (D) None of these

Space for rough work

66. The family whose x and y intercepts of a tangent at any point are respectively double of the x and y coordinates of that point is
(A) $x^2 + y^2 = c$ (B) $x^2 - y^2 = c$ (C) $xy = c$ (D) None of these

67. If $Sn = nP + \frac{n(n-1)}{2}Q$, where S_n denotes the sum of the first 'n' terms of an A.P. then the common difference is
(A) P + Q (B) 2P + 3Q (C) 2Q (D) Q

68. $\lim_{n\to\infty} \frac{1}{n}\sum_{r=1}^{2n} \frac{r}{\sqrt{n^2+r^2}}$ equals
(A) $\sqrt{5}+1$ (B) $\sqrt{5}-1$ (C) $\sqrt{2}+1$ (D) $\sqrt{2}-1$

69. A ellipse has OB as semi–minor axis, F and F′ are its foci and $\angle FBF'$ is a right angle then eccentricity of the ellipse is
(A) $\frac{1}{2}$ (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{2}{3}$ (D) $\frac{1}{3}$

70. 10 IIT and 2 NIT students sit at random in a row, and then number of ways in which exactly 3 IIT students sit between 2 NIT students is
(A) $16 \times 10!$ (B) $15 \times 10!$ (C) $10 \times 16!$ (D) none of these

Section – A
Numerical based questions

71. The value of $|x|$ such that $\begin{bmatrix}1 & 1 & x\end{bmatrix}\begin{bmatrix}1 & 0 & 2\\ 0 & 2 & 1\\ 2 & 1 & 0\end{bmatrix}\begin{bmatrix}1\\1\\1\end{bmatrix} = \begin{bmatrix}0\end{bmatrix}$

72. Let f be a one–one function with domain {–2, 1, 0} and range {1, 2, 3} such that exactly one of the following statements is true. f (–2) = 1, f (1) ≠ 1, f (0) ≠ 2 and the remaining two are false. The distance between points A(–2, 1, 0) and B(f (–2), f (1), f (0)) is

73. If in a triangle ABC, $\angle C = 135^0$, then value of tan A + tan B + tan A tan B equals

74. If number of digits in 5^{30} is P then $\frac{P}{7}$ is ($\log_{10}2 = 0.3010$)

75. The mean and variance of n observations $x_1, x_2, x_3, ..., x_n$ are 5 and 0 respectively. If $\sum_{i=1}^{n} x_i^2 = 400$, then $\frac{n}{4}$ is

Space for rough work

FIITJEE – JEE (Mains)

Batches: 12th Studying & 12th Pass

Mock Test – V

QP Code:

ANSWER KEY

SECTION – I (PHYSICS)

PART-A

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

PART-C

21.	**0.06**	22.	**0.50**	23.	**2.50**	24.	**3**
25.	**2**						

SECTION – II (CHEMISTRY)

PART-A

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

PART-C

46.	**0.227**	47.	**5**	48.	**2.66**	49.	**2**
50.	**5**						

SECTION – III (MATHEMATICS)

PART-A

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

PART-C

71.	**2**	72.	**5**	73.	**1**	74.	**3**
75.	**4**						