FIITJEE
ALL INDIA TEST SERIES
JEE (Advanced)-2025
FULL TEST – X
PAPER –2
TEST DATE: 07-05-2025

Time Allotted: 3 Hours **Maximum Marks: 180**

General Instructions:

- The test consists of total 51 questions.
- Each subject (PCM) has 17 questions.
- This question paper contains **Three Parts.**
- **Part-I** is Physics, **Part-II** is Chemistry and **Part-III** is Mathematics.
- Each **Part** is further divided into **Three Sections**: **Section-A, Section-B & Section-C**.
  Section – A *(01 – 04, 18 – 21, 35 – 38):* This section contains **TWELVE (12)** questions. Each question has **FOUR** options. **ONLY ONE** of these four options is the correct answer.
  Section – A *(05 –07, 22 – 24, 39 – 41):* This section contains **NINE (09)** questions. Each question has **FOUR** options. **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
  Section – B *(08 – 13, 25 – 30, 42 – 47):* This section contains **EIGHTEEN (18)** numerical based questions. The answer to each question is a **NON-NEGATIVE INTEGER VALUE**.
  Section – C *(14 –17, 31 – 34, 48 – 51):* This section contains **SIX (06) paragraphs.** Based on each paragraph, there are **TWO (02)** questions of numerical answer type. The answer to each question is a **NUMERICAL VALUE (XXXXX.XX).** If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places.

MARKING SCHEME

Section – A (Single Correct): Answer to each question will be evaluated according to the following marking scheme:

Full Marks	:	+3	If ONLY the correct option is chosen.
Zero Marks	:	0	If none of the options is chosen (i.e. the question is unanswered);
Negative Marks	:	–1	In all other cases.

Section – A (One or More than One Correct): Answer to each question will be evaluated according to the following marking scheme:

Full Marks	:	+4	If only (all) the correct option(s) is (are) chosen;
Partial Marks	:	+3	If all the four options are correct but ONLY three options are chosen;
Partial marks	:	+2	If three or more options are correct but ONLY two options are chosen and both of which are correct;
Partial Marks	:	+1	If two or more options are correct but ONLY one option is chosen and it is a correct option;
Zero Marks	:	0	If none of the options is chosen (i.e. the question is unanswered);
Negative Marks	:	–2	In all other cases.

Section – B: Answer to each question will be evaluated according to the following marking scheme:

Full Marks	:	+4	If ONLY the correct integer is entered;
Zero Marks	:	0	Question is unanswered;
Negative Marks	:	0	In all other cases.

Section – C: Answer to each question will be evaluated according to the following marking scheme:

Full Marks	:	+3	If ONLY the correct integer is entered;
Zero Marks	:	0	Question is unanswered;
Negative Marks	:	0	In all other cases.

Physics

PART – I

SECTION – A
(One Options Correct Type)

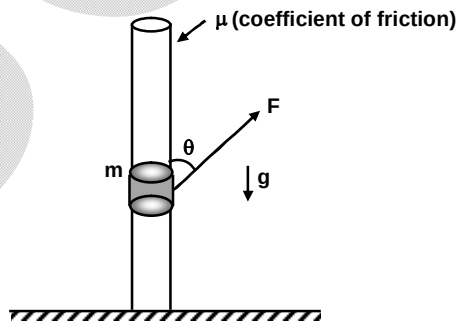
*This section contains **FOUR (04)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.*

1. A metal sphere of radius 'a' is surrounded by a concentric metal sphere of inner radius 'b', where b > a. The space between the spheres is filled with a material whose electrical conducting σ varies with electric field as $\sigma = KE$, where K is a constant and E is electric field. A potential difference V is maintained between the two spheres. What is the current between the two spheres?

(A) $\dfrac{2\pi KV^2}{\left\{\ell n\left(\dfrac{b}{a}\right)\right\}^2}$ (B) $\dfrac{4\pi KV^2}{\left\{\ell n\left(\dfrac{b}{a}\right)\right\}^2}$

(C) $\dfrac{8\pi KV^2}{\left\{\ell n\left(\dfrac{b}{a}\right)\right\}^2}$ (D) $\dfrac{\pi KV^2}{\left\{\ell n\left(\dfrac{b}{a}\right)\right\}^2}$

2. A collar of mass m is to be moved along a long fixed rough straight vertical rod by applying a force F which is constant in magnitude and whose direction is continuously changing such that θ is increased from 0° to 90° linearly with time. Initially the collar is at rest at ground and again comes to rest when the force becomes horizontal then



(A) $F = \dfrac{mg\pi}{2(1-\mu)}$ (B) $F = \dfrac{mg\pi}{(1-\mu)}$

(C) $F = \dfrac{3mg\pi}{2(1-\mu)}$ (D) $F = \dfrac{2mg\pi}{(1-\mu)}$

3. A uniform rod is kept fixed at one end at rigid wall and placed on smooth horizontal floor. It is pulled by a force under proportionality limit horizontally and released. Assume there is no energy loss and rod performs small oscillations. Then time period of oscillations of rod will be (Take mass m, length ℓ, Young's modulus Y area of cross section.

(A) $2\pi\sqrt{\dfrac{m\ell}{3AY}}$ (B) $2\pi\sqrt{\dfrac{m\ell}{AY}}$

(C) $2\pi\sqrt{\dfrac{m\ell}{2AY}}$ (D) $2\pi\sqrt{\dfrac{4m\ell}{3AY}}$

4. A straight solenoid of length ℓ having a single layer winding of copper wire whose total mass is equal to m. The cross-sectional diameter of the solenoid is assumed to be very less than its length. Take resistivity of copper wire to be ρ and density is equal to d. Then find the ratio of $\frac{L}{R}$.

($L \rightarrow$ inductance of solenoid and $R \rightarrow$ resistance of solenoid)

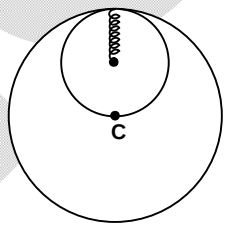
(A) $\frac{\mu_0 m}{4\pi\rho d\ell}$ (B) $\frac{\mu_0 m}{2\pi\rho d\ell}$

(C) $\frac{2\mu_0 m}{\pi\rho d\ell}$ (D) $\frac{\mu_0 m}{\pi\rho d\ell}$

SECTION – A
(One or More than one correct type)

*This section contains **THREE (03)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct answer(s).*

5. A non-conducting sphere having a spherical cavity centred at a distance 'a' from centre of sphere. Charge inside the sphere is distributed uniformly with volume density ρ. A particle of mass m having charge $-q$ is suspended vertically from light non-conducting spring of force constant k. Choose the correct statement(s). (there is no gravity and initially when $-q$ is suspended, the spring was in natural length)



(A) Maximum elongation of the spring is $\left(\frac{2\rho aq}{3\varepsilon_0 k}\right)$

(B) Maximum elongation of the spring is $\left(\frac{\rho aq}{3\varepsilon_0 k}\right)$

(C) Time period of oscillation is $2\pi\sqrt{\frac{m}{k}}$

(D) Time period of oscillation is $2\pi\sqrt{\frac{\rho m}{\varepsilon_0 k}}$

6. A ball of mass m is projected from a level ground with a velocity u making an angle θ with the horizontal. There is a horizontal wind blowing in the direction of motion of the ball. Due to wind the ball experiences a constant horizontal force of $\frac{mg}{\sqrt{3}}$ in the direction of its motion. Then choose the correct option(s).

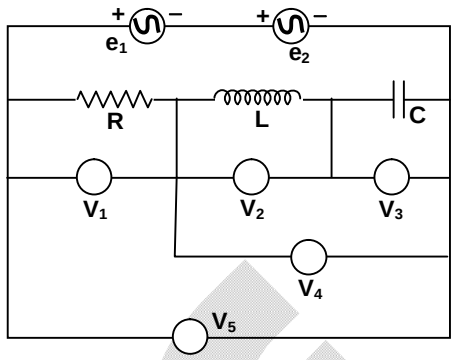
(A) Trajectory of the ball with respect to ground will not be parabolic.

(B) For horizontal range of the ball to be maximum, $\theta = 60°$

(C) For horizontal range of the ball to be maximum, $\theta = \frac{1}{2}\tan^{-1}(-2)$

(D) Maximum possible horizontal range = $\frac{\sqrt{3}u^2}{g}$.

7. A resistor R = 500 Ω, an ideal inductor L = 0.9 H and a capacitor C = 2.5 μF are connected with two alternating source $e_1 = 100 \sin(1000t)$ and $e_2 = 100\sqrt{3}\cos(1000t)$. V_1, V_2, V_3, V_4 and V_5 are five ideal voltmeters and connected in the circuit as shown in the figure. Choose the correct option(s).



(A) Phase difference between voltage of V_3 and V_5 is $\frac{\pi}{2} + \tan^{-1}\left(\frac{9}{5}\right)$

(B) Reading of V_4 is 180 volt

(C) Difference between reading of V_2 and V_1 is 80 volt.

(D) Ratio of reading of V_4 and V_5 is $\frac{1}{\sqrt{2}}$

SECTION – B

(Numerical Answer Type)

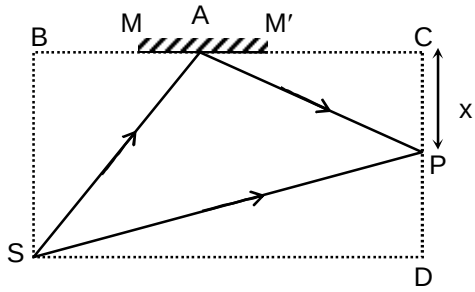
*This section contains **SIX (06)** Numerical based questions. The answer to each question is a **NON-NEGATIVE INTEGER VALUE**.*

8. An object is placed at distance 20 cm from an equi-concave lens of focal length 30 cm whose one side is silvered. If a virtual image is formed at $\frac{20}{3}$cm from lenght then what is the radius of curvature of the curved surface in cm?

9. A string of 0.2 kg/m and length 1.2 m is fixed at both ends are stretched such that tension generated in the string is 320 N. The string vibrates in six segments with amplitude of 0.25 cm. Then maximum transverse velocity of a particle which is at a distance of $\frac{1}{30}$m from the fixed end is $5k\pi$ cm/s. Find the value of k.

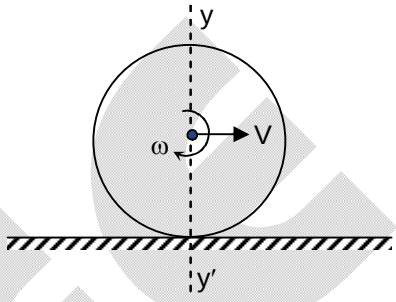
10. A small body starts falling on to the sun from a distance equal to the radius of the earth's orbit around the sun. The initial velocity of the body is zero relative to the heliocentric reference frame. If the time period of revolution of earth around the sun is T_0 and the time taken by the body to fall on the surface of sun is $\left(\frac{nT_0}{16\sqrt{2}}\right)$. Find the value of n.

11. A monochromatic point source 'S' of wavelength 'λ' is kept in front of a plane mirror MM′. Interference is observed at point 'P' of two waves SAP and SP. It is given that AB = $\sqrt{14}x$, $AC = \sqrt{8}x$, $BS = \sqrt{2}x$, $SD = \sqrt{2(11+\sqrt{2})}x$. The minimum value of 'x' for which the maximum intesnity is obtained at point P after interference is $\frac{\lambda}{k}$. Find the value of k.



12. During Searle's experiment, the zero of a vernier scale lies between 3.20×10^{-2} m and 3.25×10^{-2} m of the main scale divisions. The 20th division of the vernier scale exactly coincides with one of the main scale divisions. When an additional load of 2 kg is applied to the wire, the zero of the vernier scale still lies between 3.20×10^{-2} m and 3.25×10^{-2} m of the main scale but now the 45th division of the vernier scale coincides with one of the main scale divisions. The length of the thin metallic wire is 2 m and its cross-sectional area is 8.0×10^{-7} m^2. The least count of the vernier scale is 1.0×10^{-5} m. Find the maximum percentage error in the Young modulus of the wire.

13. A solid sphere of mass m and radius r is in pure rolling motion on a rough horizontal surface with linear speed v. The force exerted by the right half of section yy′ on the left half of section yy′ is $\frac{Kmv^2}{16r}$ newton. Find K.

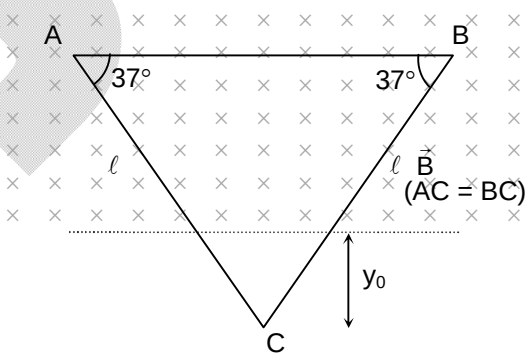


SECTION – C
(Numerical Answer Type)

*This section contains **TWO (02) paragraphs.** Based on each paragraph, there are **TWO (02)** questions of numerical answer type. The answer to each question is a **NUMERICAL VALUE (XXXXX.XX).** If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places.*

Paragraph for Question Nos. 14 and 15

A current carrying loop is in the shape of isosceles triangle of mass m lies in the vertical plane. There exists uniform horizontal magnetic field B in the region as shown in the figure. The current in the loop is i. The value of y_0 is X meter when loop is in equilibrium. If the loop is displaced slightly in its plane perpendicular to its side AB from its equilibrium position and released, then time period of its oscillation is Y sec. (neglect the induced emf in the loop, take $\frac{mg}{iB} = \frac{80}{3}$, π = 3.14 and g = 10 m/s^2)



14. The value of X is……

15. The value of Y is……

Paragraph for Question Nos. 16 and 17

A block of ice at 0°C and mass M is kept inside isolated container of negligible heat capacity. Steam of mass m at temperature 100°C is kept inside the container. The ice melted and its tempeature becomes 20°C. The steam of mass 0.2 kg at 100°C is again let inside the container, due to which temperature inside the container becomes 30°C in steady state. Latent heat of ice and steam are 80 kcal/kg and 540 kcal/kg respectively. Specific heat capacity of water is S_w = 1 kcal/kg-°C.

16. The value of m (in kg) is ……..

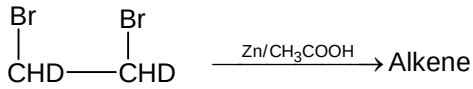
17. The value of M (in kg) is ……..

Chemistry

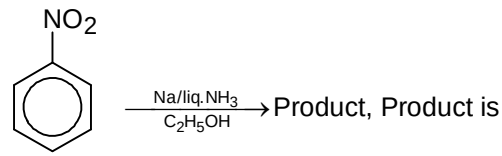
PART – II

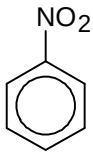
SECTION – A
(One Options Correct Type)

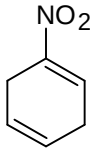
*This section contains **FOUR (04)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.*

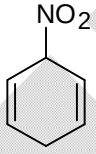
18. 

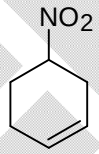
Which of the following option is incorrect?
(A) It is an example of anti elimination
(B) Reaction follows E_2 mechanism
(C) If substrate is meso then product will be trans alkene
(D) If substrate is 'd' or 'ℓ' then product will be trans alkene

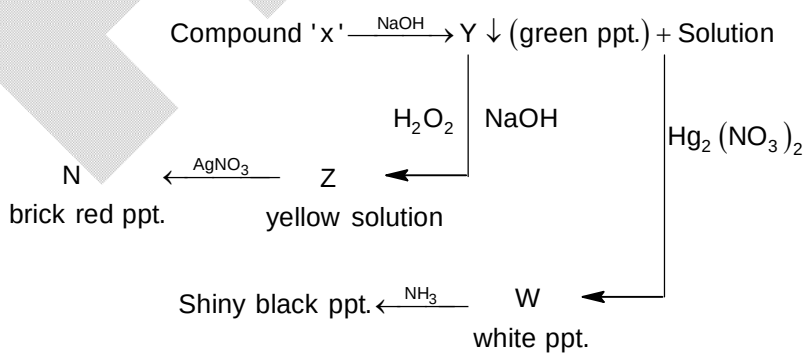
19. 

(A) 

(B) 

(C) 

(D) 

20. 

What is compound 'x'?

(A) $NiCl_3$ (B) NiS

(C) $CrCl_3$ (D) $Cr_2(SO_4)_3$

21. The radial probability distribution curve of an orbital of 'H' atom has 3 local maxima. If orbital has 2 angular node then orbital will be

(A) 5d (B) 5f

(C) 6p (D) 7f

SECTION – A

(One or More than one correct type)

*This section contains **THREE (03)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct answer(s).*

22. Among the following intensive properties are

(A) E^o_{cell} (B) E_{cell}

(C) Normality (D) Entropy

23. Which of the following solution is/are hypertonic at constant T with 0.4 M NaCl showing 80% dissociation?

(A) 0.7 M glucose

(B) 0.3 M Na_3PO_4 showing 90% dissociation

(C) 1 M $H-\overset{\overset{O}{\|}}{C}-OH$ showing 30% association

(D) 0.5 M $MgCl_2$ showing 20% dissociation

24. In isothermal compression of ideal gas

(A) W is +ve (B) ΔH is zero

(C) ΔS_{gas} is – ve (D) ΔE is zero

SECTION – B

(Numerical Answer Type)

*This section contains **SIX (06)** Numerical based questions. The answer to each question is a **NON-NEGATIVE INTEGER VALUE**.*

25. Number of co-ordination isomerism for the complex $\left[\overset{II}{Pt}(NH_3)_4\right]\left[\overset{II}{Pt}Cl_4\right]$ is (including itself)

26. For a fixed amount of a real gas when a graph of Z vs P was plotted then at very high pressure slope was observed to be 0.02 atm^{-1} at the same temperature, if a graph is plotted between PV vs. P then for 2 moles of the gas the y-intercept is found to be 50 atm litre. Calculate excluded value in litres for 10 moles of the real gas.

27. The following equilibrium are established in mixing of two gases x_2 and y in sealed container at constant temperature T.

$3x_2(g) \rightleftharpoons x_6(g)$, $K_p = 1.6\ atm^{-2}$

$x_2(g) + y(g) \rightleftharpoons x_2y(g)$, $K_P = z\ atm^{-1}$

When $x_2(g)$ and $y(g)$ are mixed in 2 : 1 molar ratio, the total pressure of gases at equilibrium is found to be 1.4 atm and partial pressure of $x_6(g)$ is 0.2 atm. The value of 6W is.

28. What is the density in gm ml^{-1} of urea solution. If its molarity is 4.0 mol lit^{-1}. and molality is 2.273 mol kg^{-1}.

29. A metal 'x' exists in the bcc structure having empty space between the atoms along the edge equal to 1.35 $\overset{o}{A}$. If molar mass of the metal is 600 gm/mole, then calculate density of the crystal in gm/ml.

$$\left[\begin{array}{l}\text{Given } \sqrt{3} = 1.73 \\ N_{av} = 6.0 \times 10^{23}\end{array}\right]$$

30. A radioactive element decays by following three different parallel paths:

$A \xrightarrow{\lambda_1} B \quad \lambda_1 = 6 \times 10^{-2} \text{ sec}^{-1}$

$2A \xrightarrow{\lambda_2} C \quad \lambda_2 = 2.5 \times 10^{-2} \text{ sec}^{-1}$

$3A \xrightarrow{\lambda_3} D \quad \lambda_3 = 5 \times 10^{-3} \text{ sec}^{-1}$

Average life of element is $= \dfrac{1}{\lambda}$

Where λ is net rate constant of the net decay reaction of A. $\lambda_1, \lambda_2, \lambda_3$ are decay constant for respective reaction. Calculate the average life of decay in sec.

SECTION – C
(Numerical Answer Type)

*This section contains **TWO (02) paragraphs.** Based on each paragraph, there are **TWO (02)** questions of numerical answer type. The answer to each question is a **NUMERICAL VALUE (XXXXX.XX).** If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places.*

Paragraph for Question Nos. 31 and 32

When 2 mole of P(g) is introduced in a closed rigid 1 litre vessel maintained at constant temperature. Following equilibrium are established

$P(g) \rightleftharpoons Q(g) + R(g), \quad K_{C_1} = W \text{ mole / litre}$

$R(g) \rightleftharpoons S(g) + Q(g), \quad K_{C_2} = Z \text{ mole / litre}$

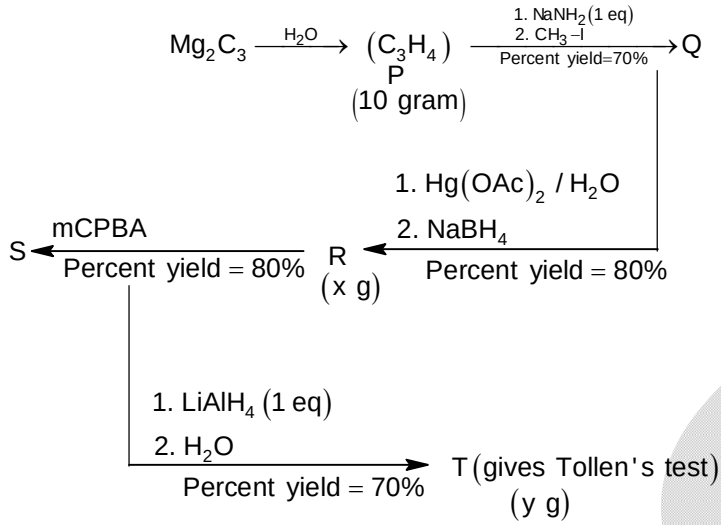
If pressure at equilibrium is twice the initial pressure and $\dfrac{[R]_{eq}}{[Q]_{eq}} = \dfrac{1}{5}$

31. The value of W is_____mol/L

32. The value of Z is_____mol/L

Paragraph for Question Nos. 33 and 34

For the following reaction scheme, percentage yields are given along the arrow



If mass of R and T are x and y g respectively then

33. The value of x is_____

34. The value of y is_____

Mathematics

PART – III

SECTION – A
(One Options Correct Type)

*This section contains **FOUR (04)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.*

35. A circle C_1 with radius 5 touches x-axis and another circle C_2 with radius 4 touches y-axis. The two circles touches each other externally so that their point of contact lies in the first quadrant, let the locus of their point of contact be the curve S. Two tangents are drawn to the curve S from point P(9, 5) to meet the curve at Q and R. The area of ΔPQR is

(A) $\frac{29}{4}$ (B) $\frac{27}{5}$

(C) $\frac{13}{2}$ (D) $\frac{25}{3}$

36. The tangent to the circle $x^2 + y^2 = 4$ at a point P intersect the parabola $y^2 = 4x$ at points Q and R. Tangents to the parabola at Q and R intersect at S. If Q lies in the first quadrant such that PQ = 1 unit, then

(A) PR = 8 units (B) SR $= \frac{35}{4}$ units

(C) SQ $= \frac{7}{2}$ units (D) area of $\Delta SQR = \frac{343}{16}$ sq. units

37. If a tangent of slope 4 of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is normal to the circle $x^2 + y^2 + 4x + 1 = 0$ then the maximum value of ab is

(A) 4 (B) 5

(C) 6 (D) 8

38. Solution of the differential equation $y^2\left(e^{x^3}+e^{y^3}\right)dy + x^2e^{x^3}\left(y^3-1\right)dx = 0$ is

(A) $e^{x^2}\left(y^3-1\right)+e^{y^3}=c$ (B) $e^{x^3}\left(y^3+1\right)-e^{y^3}=c$

(C) $e^{x^3}\left(y^3-1\right)+e^{y^3}=c$ (D) $e^{x^3}\left(y^2-1\right)+e^{y^2}=c$

(where c is arbitrary constant)

SECTION – A
(One or More than one correct type)

*This section contains **THREE (03)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct answer(s).*

39. Consider vectors $\vec{a}$, $\vec{b}$, $\vec{c}$; $\vec{p}=(\vec{b}\cdot\vec{c})\vec{a}-(\vec{c}\cdot\vec{a})\vec{b}$; $\vec{q}=(\vec{a}\cdot\vec{c})\vec{b}-(\vec{a}\cdot\vec{b})\vec{c}$; $\vec{r}=(\vec{b}\cdot\vec{a})\vec{c}-(\vec{b}\cdot\vec{c})\vec{a}$, then

(A) $\vec{p}\cdot\vec{c}=0$

(B) $\vec{p},\vec{q},\vec{r}$ can form a triangle

(C) $\Delta A(\vec{a})B(\vec{b})C(\vec{c})$ and $\Delta P(\vec{p})Q(\vec{q})R(\vec{r})$ may be similar

(D) $\vec{p},\vec{q},\vec{r}$ must be collinear

40. All x in the interval $\left(0, \frac{\pi}{2}\right)$ such that $\frac{\sqrt{3}-1}{\sin x}+\frac{\sqrt{3}+1}{\cos x}=4\sqrt{2}$ is

(A) $\frac{\pi}{12}$ (B) $\frac{11\pi}{36}$

(C) $\frac{13\pi}{36}$ (D) $\frac{11\pi}{24}$

41. If value of $3P = {}^{30}C_5 - {}^{30}C_6 + {}^{30}C_7 - ..... - {}^{30}C_{28} + 29$, and value of ${}^{Q}C_R = {}^{100}C_6 + 4\,{}^{100}C_7 + 6\,{}^{100}C_8 + 4\,{}^{100}C_9 + {}^{100}C_{10}$, then

(A) number of positive divisors of P are 16

(B) Q + R can be divisible either by 9 or 19

(C) if abcd = P, a, b, c, d $\in I^+$, then possible number of order pairs of (a, b, c, d) are 4^4

(D) P is an even integer

SECTION – B

(Numerical Answer Type)

*This section contains **SIX (06)** Numerical based questions. The answer to each question is a **NON-NEGATIVE INTEGER VALUE**.*

42. If $x^3 - ax^2 + bx + c = 0$ has the roots $\alpha^2 + \beta^3 + \gamma^4$, $\beta^2 + \gamma^3 + \alpha^4$ and $\gamma^2 + \alpha^3 + \beta^4$ where α, β, γ are the roots of $x^3 - x^2 - 1 = 0$ then the value of a + b + c is equal to _____

43. For $x \neq 0$, If $a = 1 + \frac{x^3}{3!} + \frac{x^6}{6!} + \frac{x^9}{9!} + ..., b = x + \frac{x^4}{4!} + \frac{x^7}{7!} + \frac{x^{10}}{10!} + ...$ and $c = \frac{x^2}{2!} + \frac{x^5}{5!} + \frac{x^8}{8!} + \frac{x^{11}}{11!} + ...$ then the value of $a^3 + b^3 + c^3 - 3abc$ is equal to e^{kx}, then k is equal to _____

44. There are seven letters L_1, L_2, L_3, L_4, L_5, L_6 and L_7 and six envelopes E_1, E_2, E_3, E_4, E_5, E_6 corresponding to first six letters. The total number of ways if none of the letters goes to its correct envelope, even letters goes to even envelopes. Odd letters goes to envelopes other that E_4 and E_6 and all the envelopes except E_2 contains exactly one letter is, N. If $N = 2\alpha + 4$, where $\alpha \in z$, then α is equal to _____

45. The number of values of θ in the range $[0, 2\pi]$ satisfying the equation $\cos^4 2\theta + 2\sin^2 2\theta = 17(\sin\theta + \cos\theta)^8$ is _____

46. For a function $f(x) = \frac{\ln(\{\sin x + 3\}\{\cos x + 2\} + 1)}{\{\sin x + 1\}\{\cos x + 1\}}$ (where {.} denotes the fractional part of x), then $f(0^-) + f\left(\frac{\pi^-}{2}\right) - f\left(\frac{\pi^+}{2}\right)$ is equal to ln(ke), then the value of k is _____

47. Let $A = \begin{bmatrix} 1 & \frac{3}{2} \\ 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 4 & -3 \\ -2 & 2 \end{bmatrix}$ and $C_r = \begin{bmatrix} r\cdot 3^r & 2^r \\ 0 & (r-1)3^r \end{bmatrix}$ be given matrices. If $\sum_{r=1}^{50} t_r\left((AB)^r C_r\right) = 3 + a\cdot 3^b$ _____ (where $t_r(A)$ denotes trace of matrix A), then value of $\frac{a+b}{20}$ is (where a, b $\in$ I and a is not divisible by 3)

SECTION – C
(Numerical Answer Type)

*This section contains **TWO (02) paragraphs.** Based on each paragraph, there are **TWO (02)** questions of numerical answer type. The answer to each question is a **NUMERICAL VALUE (XXXXX.XX).** If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places.*

Paragraph for Question Nos. 48 and 49

Let y = f(x) be the solution of the differential equation $\frac{dy}{dx}+\frac{k}{7}(x\tan x)=1+x\tan x-\sin x$, where f(0) = 1 and let k be the minimum value of g(x) where $g(x)=\max\left|\frac{\sqrt{193}-1}{2}\cos y+\cos\left(y+\frac{\pi}{3}\right)-x\right|$ where $y \in R$, then

48. Area bounded by y = f(x) and its inverse between $x=\frac{\pi}{2}$ and $x=\frac{7\pi}{2}$ is

49. Number of solution of the equation $f(x) = 2^x - x^2 + x + \cos x$ is equal to

Paragraph for Question Nos. 50 and 51

Let A and B be points on the same branch of the hyperbola xy = 1. Suppose that P is a point lying between A and B on this hyperbola, such that the area of the triangle APB is maximum

50. Let $A \equiv (1, 1)$ and $B \equiv \left(4, \frac{1}{4}\right)$, then abscissa of P is equal to

51. $\frac{\text{Area of the region bounded by the hyperbola and chord AP}}{\text{Area of the region bounded by the hyperbola and chord PB}}$ is equal to