

FIITJEE INTERNAL TEST

Batches: All 1921 batches
RANK IMPROVEMENT TEST – II
IIT- JEE 2021
QP CODE:

Time: 3 hours

Maximum Marks: 186

- Please read the instructions carefully. You are allotted 5 minutes specially for this purpose.
- You are not allowed to leave the examination hall before end of the test.
- Use Blue/Black Ball Point Pen only for writing particulars on Side-1 and Side-2 of the Answer Sheet. Use to Pencil is strictly prohibited.

Instructions

Note:

- The question paper contains 3 sections (Sec-1, Chemistry, Sec-II, Physics & Sec-III, Mathematics.)
- Each section is divided into one part, **Part-A**.
- Part – A** contains 18 questions which are further divided as follows:
 - PART – A (01 – 06)** contains 6 Multiple Choice Questions which have **Only One Correct answer**. Each question carries **+3 marks** for correct answer and **–1 mark** for wrong answer.
 - PART – A (07 – 14)** contains 8 Multiple Choice Questions which have **One or More Correct** answer.
 For each question in the group **Q. 7 – 14** of **PART – A** you will be awarded
Full Marks: +4 If only the bubble(s) corresponding to all the correct option(s) is (are) darkened.
Partial Marks: +1 For darkening a bubble corresponding to **each correct option**, provided NO incorrect option is darkened.
Zero Marks: 0 If none of the bubbles is darkened.
Negative Marks: –1 In all other cases.
 For example, if **(A), (C) and (D)** are all the correct options for a question, darkening all these three will result in **+4 marks**; darkening only **(A) and (D)** will result in **+2 marks**; and darkening **(A) and (B)** will result in **–1 marks**, as a wrong option is also darkened.
 - PART – A (15 – 18)** contains 2 Paragraphs. Based upon each paragraph, 2 Multiple Choice Questions. Each question has four choices (A), (B), (C) and (D), out of which **only one is correct**. Each question carries **+3 marks** for correct answer. There is no negative marking.

Name of the Candidate :

Enrolment Number :

Section – I (Chemistry)

PART – A

(Single Correct Choice Type)

This section contains 6 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which only ONE option is be correct.

1. Equivalent weight of H_3PO_3 in the reaction is
 $4\text{H}_3\text{PO}_3 \longrightarrow 3\text{H}_3\text{PO}_4 + \text{PH}_3$
- (A) $\frac{2M}{3}$ (B) $\frac{M}{2}$
 (C) $\frac{3M}{2}$ (D) $\frac{M}{6}$
1. A
2. Oxidation state of S in the following species in correct order is
 (I) S_2 (II) $\text{S}_2\text{O}_3^{2-}$ (III) SO_4^{2-} (IV) SO_5^{2-} (V) H_2S
- (A) (V) < (I) < (III) < (IV) < (II) (B) (V) < (I) < (II) < (III) = (IV)
 (C) (V) < (I) < (II) < (III) < (IV) (D) (I) < (II) < (III) < (IV) < (V)
2. B
3. 20 mL of 0.1 M AgNO_3 is mixed with 30 mL 0.2 BaCl_2 . What is the weight of AgCl ppt. formed? ($M_o \text{AgCl} = 143.5 \text{ g/mol}$)
- (A) 28.7 g (B) 2.87 g
 (C) 0.287 g (D) none of these
3. C
4. Which of the following is not a redox reaction?
- (A) $\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$ (B) $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$
 (C) $\text{H}_2\text{S} + \text{Cl}_2 \longrightarrow 2\text{HCl} + \text{S}$ (D) $\text{P}_4 + 3 \text{NaOH} + 3\text{H}_2\text{O} \longrightarrow \text{PH}_3 + 3\text{NaH}_2\text{PO}_2$
4. A
5. The ratio of the rate of diffusion of He and methane under identical condition of pressure and temperature will be
- (A) 4 (B) 2
 (C) 1 (D) 0.5+
5. B
6. Which is the correct order of molecular velocity of a gas at same temperature?
- (A) $u_{\text{rms}} < u_{\text{mp}} < u_{\text{avg}}$ (B) $u_{\text{avg}} < u_{\text{mp}} < u_{\text{rms}}$
 (C) $u_{\text{mp}} < u_{\text{avg}} < u_{\text{rms}}$ (D) $u_{\text{avg}} < u_{\text{rms}} < u_{\text{mp}}$
6. C

(Multiple Correct Choice Type)

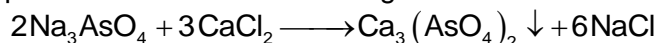
This section contains 8 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE OR MORE may be correct.

7. For the reaction
 $\text{Br}_2 + \text{OH}^- \longrightarrow \text{Br}^- + \text{BrO}_3^-$
- The correct statement(s) in the balanced equation is/are
- (A) stoichiometric coefficient of Br^- is 5
 (B) it is an example of disproportionation reaction
 (C) 6 OH^- are added on LHS to balance the equation
 (D) O.S of Br in BrO_3^- is +3
7. ABC

8. Equivalent weight of KMnO_4 depends on the pH of the solution. Which of the following statement is/are correct?
- (A) In acidic medium $E = \frac{M_o}{5}$ (B) In strongly basic medium $E = \frac{M_o}{3}$
- (C) In neutral medium it is $\frac{M_o}{3}$ (D) in weakly basic medium $E = \frac{M_o}{1}$
8. AC
9. Which of the following solution contains approximately equal hydrogen ion concentration?
- (A) 100 mL of 0.1 M HCl + 50 mL H_2O (B) 75 mL of 0.1 M HCl + 75 mL H_2O
- (C) 50 mL of 0.1 M H_2SO_4 + 100 mL H_2O (D) 100 mL of 0.1 M H_2SO_4 + 50 mL H_2O
9. AC
10. A sample of H_2O_2 is labeled as 20 volume. Which of the following statements is/are correct for this sample
- (A) its normaliy is 3.57 N
- (B) 1 mL of this sample give 20 mL of O_2 of room temperature
- (C) its strength is 60.7 g/L
- (D) its molarity is 3.57 M
10. AC
11. In the standardization of $\text{Na}_2\text{S}_2\text{O}_3$ using $\text{K}_2\text{Cr}_2\text{O}_7$ by iodometry which of the following statements is/are correct.
- (A) Equivalent wt of $\text{K}_2\text{Cr}_2\text{O}_7$ is $\frac{M_o}{6}$
- (B) Equivalent wt of $\text{K}_2\text{Cr}_2\text{O}_7$ is $\frac{M_o}{3}$
- (C) Oxidation state of $\text{Na}_2\text{S}_2\text{O}_3$ changes by 1 unit
- (D) $\text{Na}_2\text{S}_2\text{O}_3$ has oxidation state of S $\frac{+2}{3}$
11. AC
12. According to kinetic theory of gases
- (A) collisions are always elastic
- (B) heavier molecules transfer more momentum to the wall of the container
- (C) only a small number of molecules have high velocity
- (D) between collisions, the molecules move in straight lines with constant velocities
12. ABCD
13. Dalton's law of partial pressure is not applicable to which of the following gaseous mixture
- (A) $\text{NH}_3 + \text{HCl}$ (B) $\text{H}_2 + \text{O}_2$
- (C) $\text{SO}_2 + \text{O}_2$ (D) $\text{H}_2 + \text{Cl}_2$
13. AD
14. According to Graham's law of diffusion of gases rate of diffusion is
- (A) directly proportional to its density.
- (B) directly proportional to its molecular weight.
- (C) directly proportional to the square of its molecular wt.
- (D) inversely proportional to the square root of its molecular wt.
14. D

Comprehension Type
Paragraph for question nos. 15 – 16

The reaction between salt solution takes place by ions. The reaction is accelerated by formation of precipitates. Consider the following reaction.



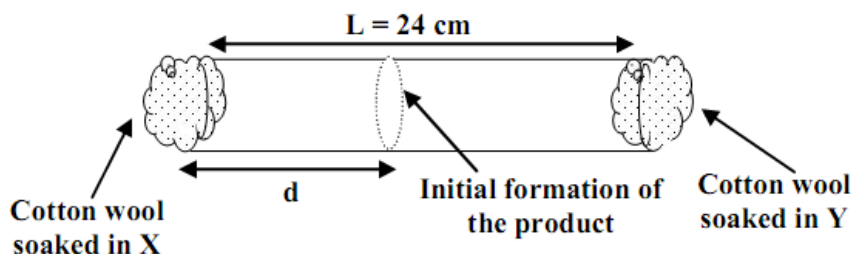
The reaction is initiated by adding 800 mL of 0.4 M sodium arsenate solution into a vessel which contains one litre of 0.5 M calcium chloride solution.

Answer the following questions on the basis of above write up.

15. What is the molarity of Cl^- (Chloride) ions in the resulting solution after completion of the reaction?
 (A) 0.42 M (B) 0.53 M
 (C) 0.55 M (D) 0.48 M
15. C
16. What is the molarity of AsO_4^{3-} ions in the resulting solution after the reaction?
 (A) 0.12 M (B) 0.17 M
 (C) 0.88 M (D) None of these
16. D

Paragraph for question nos. 17 – 18

X and Y are two volatile liquids with molar weights of 10 g mol^{-1} and 40 g mol^{-1} respectively. Two cotton plugs, one soaked in X and the other soaked in Y are simultaneously placed at the ends of a tube of length $L = 24 \text{ cm}$, as shown in the figure. The tube is filled with an inert gas at 1 atmosphere pressure and a temperature of 300 K. Vapours of X and Y react to form a product which is first observed at a distance $d \text{ cm}$ from the plug soaked in X. Take X and Y to have equal molecular diameters and assume ideal behaviour for the inert gas and the two vapours



17. The value of d in cm (shown in the figure) as estimated from Graham's law is
 (A) 8 (B) 12
 (C) 16 (D) 20
17. C
18. The experimental value of d is found to be smaller than the estimated obtained using Graham's law. This is due to
 (A) larger mean free path for X as compared to that of Y
 (B) larger mean free path for Y as compared to that of X
 (C) increased collision frequency of Y with the inert gas as compared to that of X with the inert gas
 (D) increased collision frequency of X with the inert gas as compared to that of Y with the inert gas
18. D

Section – II (Physics)

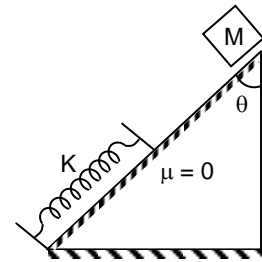
PART – A

(Single Correct Choice Type)

This section contains 6 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **only ONE** option is be correct.

1. A block of mass m is released from rest of point A. The compression in spring when the speed of block is maximum

(A) $\frac{mg \sin(\theta)}{k}$ (B) $\frac{2mg \sin(\theta)}{k}$
 (C) $\frac{mg \cos(\theta)}{k}$ (D) $\frac{mg}{k}$

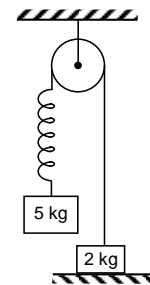


2. A cannon ball of mass M is fired with an initial velocity $\vec{u} = u_x(\hat{i}) + u_y(\hat{j})$, which makes an angle $\theta = \tan^{-1}\left(\frac{u_y}{u_x}\right)$ w.r.t. horizontal. What is the work done by gravity on the cannon ball till it reaches the maximum height?

(A) $\frac{1}{2}mu_y^2$ (B) $\frac{1}{2}mu_x^2$ (C) $(-)\frac{1}{2}mu_y^2$ (D) $(-)\frac{1}{2}mu_x^2$

3. The system shown in the figure is released from rest when spring is unstretched. Pulley and spring is massless and friction is absent everywhere. The speed of 5 kg block when 2 kg block leaves the contact with ground is (take $K = 40 \text{ N/M}$ & $g = 10 \text{ M/s}^2$)

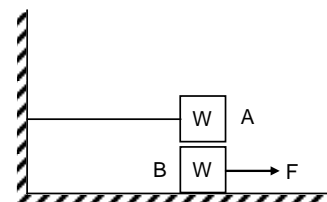
(A) $\sqrt{2}$ (m/s) (B) $2\sqrt{2}$ (m/s)
 (C) 2 (m/s) (D) $4\sqrt{2}$ (m/s)



4. Kinetic friction force acts opposite to
 (A) relative velocity (B) relative acceleration
 (C) both (A) and (B) (D) neither (A) nor (B)

5. Two identical blocks of weight W are placed one on top of the other shown in figure. The upper block is tied to the wall. The coefficient of static friction between B and ground is μ and friction between A and B is absent when $F = \mu W$ force is applied on the lower block as shown, the tension in the string will be

(A) μW (B) $\frac{\mu W}{2}$
 (C) 0 (D) cannot be determined



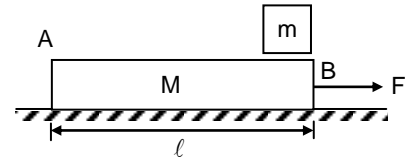
6. A block of mass 1 kg lying on the floor is subjected to a horizontal force given by $F = 2 \sin(\omega t)$. The coefficient of friction the block and the force is $\mu = 0.25$. Then
 (A) acceleration of the block is changing its direction periodically.
 (B) the force of friction is constant.
 (C) the block is oscillating forward and backward.
 (D) acceleration of the block is always zero.

(Multiple Correct Choice Type)

This section contains 8 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

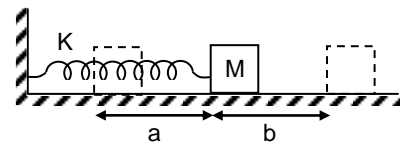
7. A particle moves in space such that its position vector \vec{r}_i varies according to $\vec{r}_i = \cos(t)\hat{i} + \sin(t)\hat{j} + (3t^2 + 1)\hat{k}$ then particle
 (A) is moving with constant acceleration.
 (B) is moving with continuously increasing speed.
 (C) has velocity and acceleration perpendicular to each other at $t = 0$.
 (D) follows path having radius of curvature $\frac{1}{\sqrt{37}}M$ at $t = 0$.

8. All surfaces are smooth, a small block of mass m is kept on plank of mass M as shown in figure



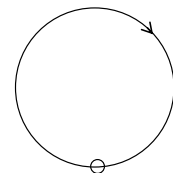
- (A) the acceleration of m w.r.t ground is $\frac{F}{m}$.
 (B) the acceleration of m w.r.t ground is zero.
 (C) the time taken by m to separate from M is $\sqrt{\frac{2\ell m}{F}}$.
 (D) the time taken by m to separate from M is $\sqrt{\frac{2\ell M}{F}}$.

9. The spring is compressed by a distance a and released. The block again comes to rest when the spring is elongated by a distance b . During this process



- (A) work done by the spring on the block is equal to $\frac{1}{2}K(a^2 + b^2)$
 (B) work done by the spring on the block $-\frac{1}{2}K(a^2 - b^2)$
 (C) coefficient of friction $= \frac{k(a - b)}{2mg}$
 (D) coefficient of friction $= \frac{k(a + b)}{2mg}$

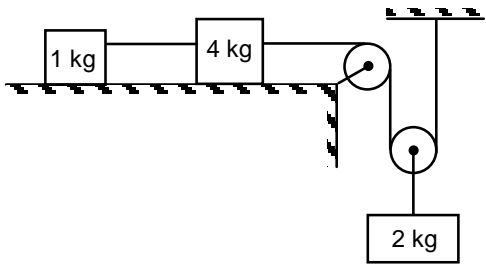
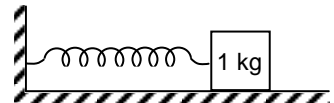
10. A small bead is threaded in a smooth fixed ring of radius 2.5 m kept in a vertical plane. What can be the velocity of bead at lower most point so that it can complete the curve?



- (A) 9 m/s
 (B) 12 m/s
 (C) 10.5 m/s
 (D) 14 m/s

11. A particle is revolving in a circular path in the vertical plane. It is attached at one end of a string of length ℓ whose other end is fixed. The velocity at the lowest point is u . The tension is \vec{T} and acceleration is \vec{a} then $\vec{T} \cdot \vec{a}$ will be zero at the highest point if

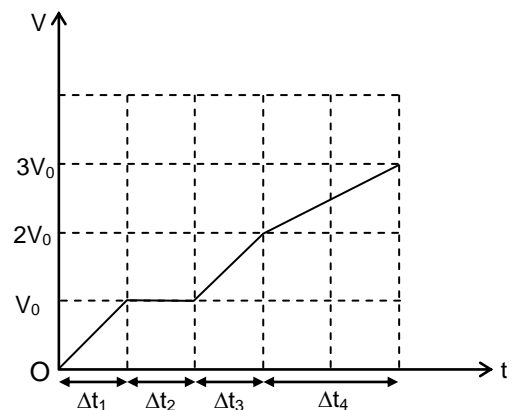
- (A) $u \leq \sqrt{2g\ell}$
 (B) $u \leq \sqrt{5g\ell}$
 (C) $u = \sqrt{2g\ell}$
 (D) $u > \sqrt{5g\ell}$

12. A particle of mass m starts moving from origin along a horizontal X-Y plane under the influence of a force of constant magnitude F (which is always parallel to the x-axis). The trajectory of its motion is $f(x) = \frac{x}{1+x^2}$, then
- (A) work done by the force F during the motion from $x = 0$ to $x = 1$ M is $(F/2)$ Nm.
 (B) work done by the force F during the motion from $x = 0$ to $x = 1$ M is (F) Nm.
 (C) final velocity of the particle is $\sqrt{\frac{2F}{M}}$
 (D) final velocity of the particle is $\sqrt{\frac{F}{M}}$.
13. 1 kg & 4 kg blocks lie on a rough horizontal surface. The coefficient of friction between 4 kg block and surface is 0.2 while the coefficient of friction between 1 kg block and the surface is 0.6. All the pulley shown in the figure are massless and frictionless and all string are massless
- 
- (A) the frictional force acting on 1 kg block is 2 N.
 (B) the frictional force acting on 1 kg block is 6 N
 (C) the tension in the string connecting 4 kg block & 1 kg block is 2 N.
 (D) The tension in string connecting 1 kg block and 4 kg block is zero.
14. A block of mass 1 kg is pressed against a spring of force constant 400 Nm. The spring is compressed by 10 cm and block is released. Which of the following is a possible velocity of the block during subsequent motion?
- 
- (A) 2 m/s
 (B) 1 m/s
 (C) 3 m/s
 (D) 4 m/s

Comprehension Type
Paragraph for question nos. 15 – 16

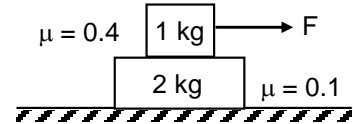
Figure given the velocity (v) versus time (t) graph of a carriage of constant mass being moved along an axis by applying force. The time axis shows four time periods with $\Delta t_1 = \Delta t_2 = \Delta t_3$ & $\Delta t_3 = 2\Delta t_1$.

15. The work done by the force is maximum during time period
- (A) Δt_3 & Δt_4
 (B) Δt_1 , Δt_3 & Δt_4
 (C) only Δt_3
 (D) only Δt_4
16. The rate at which work done is maximum
- (A) only Δt_1
 (B) Δt_1 & Δt_3
 (C) only Δt_3
 (D) only Δt_4



Paragraph for question nos. 17 – 18

A constant force F starts acting horizontally on upper block of mass 1 kg.



17. The range of value of F for which the block is static relative to plank is
(A) $F \leq 4.5$ N (B) $F \leq 7.5$ N
(C) $F \leq 4$ N (D) $F \leq 3$ N
18. Friction force between plank and block if $F = 2$ N,
(A) 3 N (B) 4 N
(C) 2.5 N (D) 2 N

Section – III (Mathematics)

PART – A

(Single Correct Choice Type)

This section contains 6 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **only ONE** option is be correct.

1. Through a point A on a circle, a chord AP is drawn & on the tangent at A, a point T is taken such that $AT = AP$. If TP produced meet the diameter through A at Q, then the limiting value of AQ when P moves up to A is
 (A) equal the diameter of the circle. (B) double the diameter of the circle.
 (C) half the diameter of the circle. (D) one fourth the diameter of the circle.

1. B

2. Let $f(x)$ be a continuous function which satisfies $f(x^2 + 1) = \frac{2}{f(2^x) - 1}$ and

$f(x) > 0 \forall x \in \mathbb{R}$. Then $\lim_{x \rightarrow 1} f(x)$ is

- (A) 4 (B) 2
 (C) 1 (D) does not exist

2. B

3. Let N be any four digit number say $x_1x_2x_3x_4$. Then maximum value of $\frac{N}{x_1 + x_2 + x_3 + x_4}$ is

equal to

- (A) 1000 (B) $\frac{1111}{4}$
 (C) 800 (D) 700

3 A

4. If $f(n, \theta) = \prod_{r=1}^n \left(1 - \tan^2 \frac{\theta}{2^r} \right)$, then the value of $\lim_{\theta \rightarrow 0} \lim_{n \rightarrow \infty} (f(n, \theta))$ will be

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

4. C

5. Maximum number of non – similar isosceles triangles ABC that can be formed such that $\tan A + \tan B + \tan C = 100$, will be

- (A) 1 (B) 2
 (C) 3 (D) None of these

5. B

6. Let $A(p^2, -p), B(q^2, q), C(r^2, -r)$ be the vertices of a triangle ABC. A parallelogram AFDE is drawn with D, E and F on the segments BC, CA and AB respectively. Then the maximum area of the parallelogram is, given $p > q > r$.

(A) $\left(\frac{1}{4}\right)(p-q)(q-r)(p-r)$ (B) $\left(\frac{1}{4}\right)(p+q)(q-r)(p-r)$
 (C) $\left(\frac{1}{4}\right)(p+q)(q+r)(p+r)$ (D) $\left(\frac{1}{4}\right)(p+q)(q+r)(p-r)$

6. D

(Multiple Correct Choice Type)

This section contains 8 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

7. If $f: \mathbb{R} \rightarrow \mathbb{R}$ be a differentiable function and $f(0) = 0$ and $f'(0) = 1$, then

$$\lim_{x \rightarrow 0} \frac{1}{x} \left[f(x) + f\left(\frac{x}{2}\right) + f\left(\frac{x}{3}\right) + \dots + f\left(\frac{x}{n}\right) \right], \text{ where } n \in \mathbb{N}, \text{ equals}$$

- (A) 0
 (B) $1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}$
 (C) ${}^n C_1 - \frac{{}^n C_2}{2} + \frac{{}^n C_3}{3} - \dots + (-1)^{n-1} - \frac{{}^n C_n}{n}$
 (D) does not exist

7. BC

8. Given $f(x) = \begin{cases} 3 - \left[\cot^{-1} \left(\frac{2x^3 - 3}{x^2} \right) \right], & \text{for } x > 0 \\ \{x^2\} \cos(e^{1/x}), & \text{for } x < 0 \end{cases}$ where $\{ \}$ and $[\]$ denotes the fractional part and the integral part functions respectively, then which of the following statement does not hold good

- (A) $f(0^-) = 0$
 (B) $f(0^+) = 3$
 (C) $f(0) = 0 \Rightarrow$ Continuity of f at $x = 0$
 (D) irremovable discontinuity of f at $x = 0$

8. BD

9. If $e^{\sin(x^2+y^2)} = \tan \frac{y^2}{4} + \sin^{-1} x$, then $y'(0)$ can be

(A) $\frac{1}{3\sqrt{\pi}}$ (B) $-\frac{1}{3\sqrt{\pi}}$
 (C) $-\frac{1}{5\sqrt{\pi}}$ (D) $-\frac{1}{3\sqrt{5\pi}}$

9. ABD

10. Of all the lines tangent to the graph of the curve $y = \frac{6}{x^2 + 3}$, the equation of the tangent lines of
- (A) minimum slope will be $3x + 4y - 9 = 0$
 (B) minimum slope will be $3x + 4y = -9$
 (C) maximum slope will be $3x - 4y + 9 = 0$
 (D) maximum slope will be $3x - 4y = 9$

10. AC

11. For the function $f(x) = x \cos \frac{1}{x}$, $x \geq 1$,
- (A) for at least one x in the interval $[1, \infty)$, $f(x+2) - f(x) < 2$
 (B) $\lim_{x \rightarrow \infty} f'(x) = 1$
 (C) for all x in the interval $[1, \infty)$, $f(x+2) - f(x) > 2$
 (D) $f'(x)$ is strictly decreasing in the interval $[1, \infty)$

11. BCD

12. The curve $y = \frac{x+1}{x^2+1}$ has
- (A) $x = 1$, as point of inflection
 (B) $x = -2 + \sqrt{3}$, as point of inflection
 (C) $x = -1$, as point of minimum
 (D) $x = -2 - \sqrt{3}$, as point of inflection

12. ABD

13. Let $f(x) = \begin{cases} \frac{\tan^2 \{x\}}{x^2 - [x]^2}, & \text{for } x > 0 \\ 1, & \text{for } x = 0 \\ \sqrt{\{x\} \cot \{x\}}, & \text{for } x < 0 \end{cases}$ where $[x]$ is the step up function and $\{x\}$ is the fractional

part function of x , then:

- (A) $\lim_{x \rightarrow 0^+} f(x) = 1$
 (B) $\lim_{x \rightarrow 0^-} f(x) = 1$
 (C) $\cot^{-1} \left(\lim_{x \rightarrow 0^-} f(x) \right)^2 = 1$
 (D) f is continuous at $x=1$.

13. AC

14. $\lim_{x \rightarrow \infty} \frac{(ax+1)^n}{x^n + A}$ is equal to
- (A) a^n if $n \in \mathbb{N}$ (B) ∞ if $n \in \mathbb{Z}^-$ and $a = A = 0$
 (C) $\frac{1}{1+A}$ if $n = 0$ (D) a^n if $n \in \mathbb{Z}^-, A = 0$ and $a \neq 0$
14. ABCD

Comprehension Type
Paragraph for question nos. 15 – 16

A function $f(x)$ having the following properties:

- (i) $f(x)$ is continuous except at $x = 3$
 (ii) $f(x)$ is differentiable except at $x = -2$ and $x = 3$
 (iii) $f(0) = 0, \lim_{x \rightarrow 3} f(x) \rightarrow -\infty, \lim_{x \rightarrow -\infty} f(x) = 3, \lim_{x \rightarrow \infty} f(x) = 0$
 (iv) $f'(x) > 0 \forall x \in (-\infty, -2) \cup (3, \infty)$ and $f'(x) \leq 0 \forall x \in (-2, 3)$
 (v) $f''(x) > 0 \forall x \in (-\infty, -2) \cup (-2, 0)$ and $f''(x) < 0 \forall x \in (0, 3) \cup (3, \infty)$

then answer the following questions

15. Graph of function $y = f(-|x|)$ is
- (A) differentiable for all x , if $f'(0) = 0$
 (B) continuous but not differentiable at two points, if $f'(0) = 0$
 (C) continuous but not differentiable at one point, if $f'(0) = 0$
 (D) discontinuous at two points, if $f'(0) = 0$
15. B
16. $f(x) + 3x = 0$ has five solutions if
- (A) $f(-2) > 6$ (B) $f'(0) < -3$ and $f(-2) > 6$
 (C) $f'(0) > -3$ (D) $f'(0) > -3$ and $f(-2) > 6$
16. D

Paragraph for question nos. 17 – 18

Suppose $f(x)$ is a real valued polynomial function of degree 6 satisfying the following condition

- (a) f has minimum value at $x = 0$ & 2
 (b) f has maximum value at $x = 1$

(c) for all $x, \lim_{x \rightarrow 0} \frac{1}{x} \ln \begin{vmatrix} f(x)/x & 1 & 0 \\ 1 & 1/x & 1 \\ 1 & 0 & 1/x \end{vmatrix} = 2$

On the basis of above information, answer the following questions:

17. Number of solutions of the equation $8f(x) - 1 = 0$ is –
- (A) one (B) two
 (C) three (D) four
17. D

18. Range of $f(x)$ is

(A) $\left[-\frac{32}{15}, \infty\right)$

(B) $\left[-\frac{4}{15}, \infty\right)$

(C) $\left(-\infty, \frac{2}{15}\right]$

(D) none of these

18. A

space for rough work

FIITJEE INTERNAL TEST

Batches: All 1921 batches
RANK IMPROVEMENT TEST – II

IIT- JEE 2021

QP CODE:

ANSWERS

SECTION – I (Chemistry)

Part – A

SECTION – II (Physics)

Part – A

- | | | | |
|--------|---------|---------|--------|
| 1. C | 2. C | 3. B | 4. A |
| 5. C | 6. D | 7. BCD | 8. BD |
| 9. BC | 10. BCD | 11. ABC | 12. BC |
| 13. AC | 14. AB | 15. D | 16. C |
| 17. A | 18. D | | |

SECTION – III (Mathematics)

Part – A