# FIITJEE - JEE (Main)

## PHYSICS, CHEMISTRY & MATHEMATICS

## BATCH: NWCMPA425B1

### PHASE TEST – I

### Q.P. CODE: 100744

**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

**Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.**

### A. General Instructions

**Forthcoming Exam – FTRE on 15th Sept. 2024.**

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.
2. This question paper contains **Three Sections.**
3. **Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
4. Each **Section** is further divided into **Two Parts**: **Part-A & B** in the OMR.
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. No candidate is allowed to carry any textual material, printed or written, bits of papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices ext. except the Admit Card inside the examination hall / room.

### B. Filling of OMR Sheet:

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.

*** In multiple choice questions the options are given as F,T,R & E which correspond to the options A,B,C & D respectively in the OMR sheet.**

2. On the OMR sheet, darken the appropriate bubble with ***Blue/Black Ball Point Pen*** for each character of your Enrolment No. and write in ink your Name, Test Centre and other details at the designated places.
3. OMR sheet contains alphabets, numerals & special characters for marking answers.
4. **Do not fold or make any stray marks on the Answer Sheet.**

### C. Marking Scheme for All Two Parts:

**(i) Part-A (01-20) –** Contains Twenty (20) multiple choice objective questions which have four (4) options each and only one correct option. Each question carries **+4 marks** which will be awarded for every correct answer and **-1 mark** will be deducted for every incorrect answer.

**(ii) Part-B (01-05)** contains five (05) Numerical based questions, the answer of which maybe positive or negative numbers or decimals **Two decimal Places** (e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) and each question carries **+4 marks** for correct answer and **there will be no negative marking.**

**Name of the Candidate :**_____

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

**Enrolment Number :**_____

*** In multiple choice questions the options are given as F,T,R & E which correspond to the options A,B,C & D respectively in the OMR sheet.**

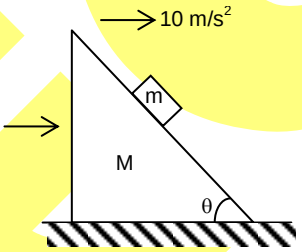
# Physics

## PART – A

### Straight Objective Type

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

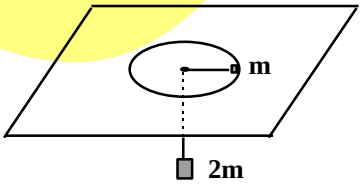
1. In the figure shown all the surfaces are frictionless, and mass of the block, m = 1kg. The block and wedge are held initially at rest. Now wedge is given a horizontal acceleration of 10 $m/s^2$ by applying a force on the wedge so that the block does not slip on the wedge. Then work done by the normal force in ground frame on the block in $\sqrt{3}$ seconds is




(F) 30J (T) 60J

(R) 150J (E) $100\sqrt{3}$ J

2. A mass m rotating freely in a horizontal circle of radius 1m on a frictionless smooth table supports a stationary mass 2m attached to the other end of the string hanging vertically. Angular velocity of rotation is



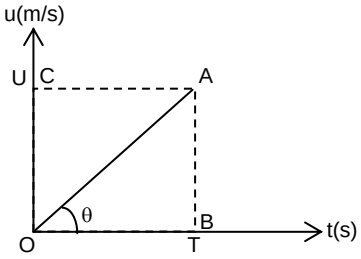

(F) $\sqrt{5g}$ rad/s (T) $\sqrt{2g}$ rad/s

(R) $\sqrt{g}$ rad/s (E) $\infty$rad/s

3. The magnitude of radius vector of a point varies with time as $r = \beta t(1 - \alpha t)$ where $\alpha$ and $\beta$ are positive constant. The distance travelled by this body till its displacement becomes zero.

(F) $\frac{\beta}{\alpha}$ (T) $\frac{\beta}{2\alpha}$ (R) $\alpha\beta$ (E) $\frac{2\alpha}{\beta}$

4. The velocity time graph of a body is shown in the figure. If the slope of the line is m, then the distance travelled by the body in time T is




(F) $mU^2 / 2T$ (T) $2U^2 / T$

(R) $\frac{2U^2}{m}$ (E) $U^2 / 2m$

*Space For Rough Work*

5. A particle of mass 4m which is at rest explodes into masses m, m and 2m , two of the fragments of masses m and 2m are found to move with equal speed v each in opposite directions. The total mechanical energy released in the process of explosion is

(F) $mv^2$ (T) $2mv^2$

(R) $\frac{1}{2}mv^2$ (E) $4mv^2$

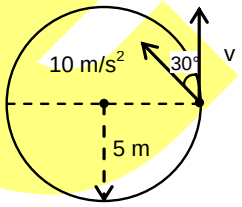
6. The unit vector perpendicular to $\vec{i}-2\hat{j}+\hat{k}$ and $3\vec{i}+\hat{j}-2\hat{k}$ is

(F) $\frac{5\vec{i}+3\hat{j}+7\hat{k}}{\sqrt{83}}$ (T) $\frac{3\vec{i}+5\hat{j}+7\hat{k}}{\sqrt{83}}$ (R) $\frac{5\vec{i}+3\hat{j}-7\hat{k}}{\sqrt{83}}$ (E) $\frac{3\vec{i}-5\hat{j}+7\hat{k}}{\sqrt{83}}$

7. The velocity of a particle varies with time as $\vec{v}=3\hat{i}+(4-5t)\hat{j}$ m/s. Find the average velocity of the particle for a time interval between t = 0 and a time when the speed of the particle becomes minimum.

(F) $(3\hat{i}+2\hat{j})$ m/s (T) $(6\hat{i}+5\hat{j})$ m/s (R) $(4\hat{i}+\hat{j})$ m/s (E) $(3\hat{i}-5\hat{j})$ m/s

8. Find out speed of the particle which is moving on the circle shown in the figure




(F) 10 m/s (T) 5 m/s

(R) 2.5 m/s (E) 20 m/s

9. A stone projected at an angle of 60º from the ground level strikes at an angle of 30º on the roof of a building of height h. Then the speed of projection of the stone is:

(F) $\sqrt{2gh}$ (T) $\sqrt{6gh}$ (R) $\sqrt{3gh}$ (E) $\sqrt{gh}$

10. A car starts form rest to cover a distance s. the coefficient of friction between the road and the tyres is $\mu$. The minimum time in which the car can cover the distance is proportional to

(F) $\mu$ (T) $\sqrt{\mu}$ (R) $\frac{1}{\mu}$ (E) $\frac{1}{\sqrt{\mu}}$

11. For a particle moving in a straight line, the displacement of the particle at time t is given by $S=t^3-6t^2+3t+7$. What is the velocity of the particle when its acceleration is zero?

(F) –9 $ms^{-1}$ (T) –12 $ms^{-1}$ (R) 3 $ms^{-1}$ (E) 42 $ms^{-1}$

12. If $\vec{A}=2\hat{i}+3\hat{j}-\hat{k}$ and $\vec{B}=-\hat{i}+3\hat{j}+4\hat{k}$, then projection of $\vec{A}$ on $\vec{B}$ will be

(F) $\frac{3}{\sqrt{13}}$ (T) $\frac{3}{\sqrt{26}}$ (R) $\sqrt{\frac{3}{26}}$ (E) $\sqrt{\frac{3}{13}}$

***Space For Rough Work***

13. If a unit vector is represented by $0.5\hat{i} + 0.8\hat{j} + c\hat{k}$, then the value of 'c' is

(F) 1 (T) $\sqrt{0.11}$ (R) $\sqrt{0.01}$ (E) $\sqrt{0.39}$

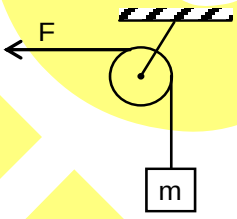
14. If $\vec{A}\cdot\vec{B} + |\vec{A}\times\vec{B}| = \sqrt{2}AB$, find the value of $\theta$.

(F) 0° (T) 90° (R) 30° (E) 45°

15. A body of mass 1kg is thrown upwards with a velocity 20m/s. It momentarily comes to rest after attaining a height of 18m. How much energy is lost due to air friction. ($g = 10\ m/s^2$)

(F) 10J (T) 20J (R) 30J (E) 40J

16. A block of mass m is hanging over a smooth and light pulley through a light string. The other end of the string is pulled by a constant force F. The kinetic energy of the block increase by 20 J in 1 seconds.

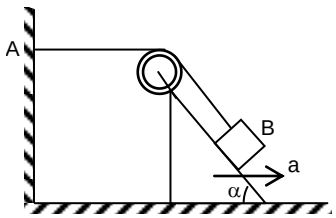



(F) The work done by the tension on the block is 20 J in 1 second.
(T) The work done by the tension on he block is greater than 20 J in one second.
(R) The work done by the tension on the block is less than 20 J in one second.
(E) None of the above statements are correct.

17. A particle of mass m describes a circle of radius r. The centripetal acceleration of the particle is $\frac{4}{r^2}$. What will be the linear momentum of particle?

(F) $\frac{2m}{r}$ (T) $\frac{2m}{\sqrt{r}}$ (R) $\frac{4m}{\sqrt{r}}$ (E) $\frac{4m}{r}$

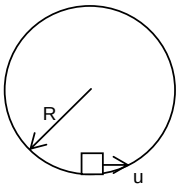
18. A weightless inextensible rope rests on a stationary wedge forming an angle $\alpha$ with the horizontal. One end of the rope is fixed to the wall at point A. A small load is attached to the rope at point B. The wedge starts moving to the right with a constant acceleration a. The magnitude of acceleration of the load is given by:




(F) a (T) $2a\sin\frac{\alpha}{2}$

(R) $a\sin\alpha$ (E) $g\sin\alpha$

19. A particle is given an initial speed 'u' inside a smooth fixed spherical shell of radius R = 1 m such that it is just able to complete the circle. Acceleration of the particle when its velocity is vertical, is

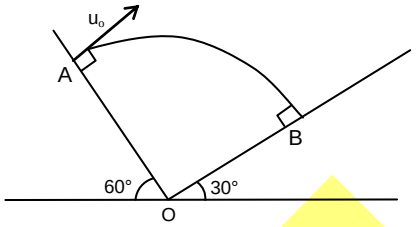



(F) $g\sqrt{10}$ (T) g

(R) $g\sqrt{2}$ (E) 3 g

*Space For Rough Work*

20. A projectile is thrown from one inclined plane in a direction perpendicular for this plane. It is observed that this projectile hits the other incline plane perpendicular to that plane, then the ratio $\frac{OA}{OB}$ will be




(F) $2\sqrt{3}$ (T) $\frac{1}{2\sqrt{3}}$ (R) $\sqrt{3}$ (E) $\frac{1}{\sqrt{3}}$

## PART-B
## Numerical Type

1. Two particles having position vectors $\vec{r}_1 = \left(3\hat{i} + \hat{5}\right)$ metres and $\vec{r}_2 = \left(-5\hat{i} - 3\hat{j}\right)$ metres are moving with velocities $\vec{v}_1 = \left(4\hat{i} + 3\hat{j}\right)$ and $\vec{v}_2 = \left(a\hat{i} + 7\hat{j}\right)$ m/s. If they collide after 2 seconds, the value of a is

2. In a ballistics demonstration, a police officer fires a bullet of mass 50.0 g with speed 200 m $s^{-1}$ on soft plywood of thickness 2.00 cm. The bullet emerges with only 10% of its initial kinetic energy. What is the emergent speed of the bullet (in $ms^{-1}$)?

3. An object is displaced from point A(1m, 2m, 3m) to a point B(2m, 3m, 4m) under a constant force $\vec{F} = \left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)$N. Find the work done by this force in this process. (in joule )

4. A moving car encounters air resistance which is proportional to the square of the speed of the car. Find the value of $\frac{2 \times \text{Power required at 40 kmph}}{\text{Power required at 80 kmph}}$

5. Man A sitting in a car moving with 54 km/hr observes man B in front of car crossing perpendicularly the road of width 15 m in 3 s. If $\theta$ is the angel between motion of B and motion of car then find the value of cot $\theta$.

***Space For Rough Work***

*** In multiple choice questions the options are given as F,T,R & E which correspond to the options A,B,C & D respectively in the OMR sheet.**

# Chemistry

## PART – A

### Straight Objective Type

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

1. $2A(g)+B(g)+C(g)\longrightarrow A_2BC(g)$

The rate law expression of the above reaction is given as follows:
Rate = $k[A]^2[B]^0[C]^1$
What is the overall order of the reaction?
(F) 2 (T) 3
(R) 4 (E) Unpredictable

2. $C(s)+O_2(g)\rightleftharpoons CO_2(g)$

The equilibrium constant of above reaction is given as:
(F) $K_C=\frac{[CO_2]}{[C][O_2]}$ (T) $K_C=\frac{[CO_2]}{[O_2]^2}$
(R) $K_P=\frac{p_{CO_2}}{p_{O_2}}$ (E) $K_P=\frac{p_{CO_2}}{p_C\times p_{O_2}}$

3. The half-life of a chemical reaction does not change if the reaction starts with any concentration of the reactant? What is the order of the reaction?
(F) Zero (T) First
(R) Second (E) Third

4. $2KClO_3(s)\overset{\Delta}{\rightleftharpoons}2KCl(s)+3O_2(g)$

The equilibrium constant $K_P$ of above reaction is 8 $atm^3$ at 400 K. What is the equilibrium pressure of the system?
(F) 8 atm (T) 2 atm
(R) 6 atm (E) 4 atm

5. The solubility product of CuCl at 25°C is x, what is the molarity of the saturated solution of CuCl?
(F) x M (T) $\sqrt{x}$ M
(R) $x^2$ M (E) 2 x M

***Space For Rough Work***

6. The dissociation constant($K_a$) of a weak acid(HA) is $10^{-8}$ at 25°C. What is the equilibrium constant of the following reaction?

$$A^-(aq) + H_2O \rightleftharpoons HA(aq) + OH^-(aq)$$

(F) $10^{-4}$
(T) $10^{6}$
(R) $10^{-6}$
(E) $10^{4}$

7. $CH_3COOH(aq) \rightleftharpoons CH_3COO^-(aq) + H^+(aq)$

Which of the following is not a factor of the degree of dissociation($\alpha$) of $CH_3COOH$ in the above equilibrium?

(F) Temperature
(T) Addition of water
(R) Pressure
(E) Addition of common ion

8. If the radius of the first orbit of hydrogen atom be $a_0$, what will be the radius of its third orbit?

(F) $3a_0$
(T) $6a_0$
(R) $9a_0$
(E) $12a_0$

9. $Mg_3N_2 + H_2O \rightarrow X(solution) + Y(gas)$

Gas (Y) in the above reaction is

(F) $N_2$
(T) $NH_3$
(R) NO
(E) $NO_2$

10. Which of the following has maximum dipole moment?

(F) $CO_2$
(T) $BF_3$
(R) $NF_3$
(E) $CF_4$

11. Which of the following two compounds cannot be distinguished by the action of heat?

(F) $Na_2CO_3$ and $Li_2CO_3$
(T) $NaNO_3$ and $LiNO_3$
(R) $MgCO_3$ and $CaCO_3$
(E) $Mg(NO_3)_2$ and $MgCO_3$

12. What is the orbital angular momentum for the unpaired electron of chlorine?

(F) $\frac{h}{\sqrt{2}\pi}$
(T) $\frac{\sqrt{2}\pi}{h}$
(R) $\frac{\sqrt{2}h}{\pi}$
(E) $\frac{2\pi}{h}$

***Space For Rough Work***

13. If the energy of the first orbit of hydrogen atom is –x eV, what will be the energy of its second orbit in eV unit?

(F) $\frac{x}{2}$ (T) $-\frac{x}{4}$

(R) $\frac{x}{4}$ (E) $-\frac{x}{2}$

14. What is the bond angle of $BeF_2$?

(F) $120^o$ (T) $180^o$

(R) $160^o$ (E) $140^o$

15. The most commonly used food preservative is

(F) sodium cyclamate (T) sodium benzoate

(R) sodium acetate (E) vanillin

16. Lattice energy of an ionic compound depends upon

(F) charge on the ion only (T) size of the ion only

(R) packing of ions only (E) charge, size & packing of ions

17. A one litre vessel initially contains 2.0, 0.5 and 0.0 moles of $N_2$, $H_2$ and $NH_3$ respectively. The system after attaining equilibrium has 0.2 mole of $NH_3$. The number of moles of $H_2$ in the vessel at equilibrium is

(F) 0.3 (T) 0.4

(R) 0.2 (E) 1.8

18. What is the sum of the number of radial and angular nodes of an 4d orbital?

(F) 1 (T) 2

(R) 4 (E) 3

19. The ionic radii of $N^{3-}$, $O^{2-}$, $F^-$ and $Na^+$ follow the order

(F) $N^{3-} > O^{2-} > F^- > Na^+$ (T) $N^{3-} > Na^+ > O^{2-} > F^-$

(R) $Na^+ > O^{2-} > N^3 > F^-$ (E) $O^{2-} > F^- > Na^+ > N^{3-}$

20. The decreasing order of second ionization potential of K, Ca and Ba is

(F) K > Ca > Ba (T) Ca > Ba > K

(R) Ba > K > Ca (E) K > Ba > Ca

***Space For Rough Work***

## PART-B
## Numerical Type

1. How many maximum number of electrons of oxygen atom can have spin quantum number equal to +½?

2. What is the value of $\frac{t_{99.99\%}}{2\times t_{1/2}}$ of a first order reaction?

   $t_{99.99\%}$ = Time needed for 99.99% completion of the reaction

   $t_{1/2}$ = Half-life period of the reaction

3. $NH_4Cl(s) \rightleftharpoons NH_3(g) + HCl(g)$

   Above reaction attains equilibrium at 6 atm and T K. The equilibrium constant $K_P$ of the reaction in $atm^2$ unit is:

4. A buffer solution contains $CH_3COOH$ and $CH_3COONa$ in the molar ratio of 10 : 1. What is the pH of the buffer? [$K_a$ of $CH_3COOH = 10^{-5}$]

5. How many electron(s) is/are present in the outermost antibonding molecular orbitals of peroxide($O^{2-}$) ion?

***Space For Rough Work***

*** In multiple choice questions the options are given as F,T,R & E which correspond to the options A,B,C & D respectively in the OMR sheet.**

# Mathematics

## PART – A

### Straight Objective Type

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

1. Range of the function f defined by $f(x)=\left[\frac{1}{\sin\{x\}}\right]$ (where $[*]$ and $\{*\}$ respectively denotes the greatest integer and the fractional part function is

(F) I, the set of integers
(T) N, the set of natural numbers
(R) W, the set of whole numbers
(E) Q, the set of rational numbers

2. $\lim\limits_{x\to 0}\left(\frac{\ln(a+x)-\ln a}{x}\right)+k\lim\limits_{x\to e}\frac{\ln x-1}{x-e}=1$ then

(F) $k=e\left(1-\frac{1}{a}\right)$
(T) $k=e(1+a)$
(R) $k=e(2-a)$
(E) The equality is not possible

3. The set of values of a for which the function $f(x)=(4a-3)(x+\ln 5)+2(a-7)\cot\left(\frac{x}{2}\right)\sin^2\left(\frac{x}{2}\right)$ does not posses critical points is

(F) $(1,\infty)$
(T) $[1,\infty)$
(R) $(-\infty,2)$
(E) $\left(-\infty,\frac{-4}{3}\right)\cup(2,\infty)$

4. If $f(x)=\{x^2\}-(\{x\})^2$, where $\{x\}$ denotes the fractional part of x, then

(F) $f(x)$ is continuous at $x=2$ but not at $x=-2$
(T) $f(x)$ is continuous at $x=-2$ but not at $x=2$
(R) $f(x)$ is discontinuous at $x=2$ and $x=-2$
(E) None

*Space For Rough Work*

5. If $f(x) = x + \tan x$ and f is inverse of g, then $g'(x)$ is equal to

(F) $\frac{1}{1+(g(x)-x)^2}$ (T) $\frac{1}{1-(g(x)-x)^2}$

(R) $\frac{1}{2+(g(x)-x)^2}$ (E) $\frac{1}{2-(g(x)-x)^2}$

6. Tangents are drawn from the origin to the curve $y = \sin x$, then their point of contact lie on the curve

(F) $x^2 + y^2 = 1$ (T) $x^2 - y^2 = 1$

(R) $\frac{1}{x^2} + \frac{1}{y^2} = 1$ (E) $\frac{1}{y^2} - \frac{1}{x^2} = 1$

7. Let $y = x^2 e^{-x}$, then the interval in which y increases with respect to x is

(F) $(-\infty, \infty)$ (T) $(-2, 0)$

(R) $(2, \infty)$ (E) $(0, 2)$

8. On which of the following intervals is the function $x^{100} + \sin x - 1$ decreasing?

(F) $\left(0, \frac{\pi}{2}\right)$ (T) (0, 1)

(R) $\left(\frac{\pi}{2}, \pi\right)$ (E) None of these

9. $\int \frac{3 + 2\cos x}{(2 + 3\cos x)^2} dx$ is equal to

(F) $\left(\frac{\sin x}{2 + 3\cos x}\right) + c$ (T) $\left(\frac{2\cos x}{2 + 3\sin x}\right) + c$

(R) $\left(\frac{2\cos x}{2 + 3\cos x}\right) + c$ (E) $\left(\frac{2\sin x}{2 + 3\sin x}\right) + c$

10. If $I_1 = \int_0^{\pi/2} \cos(\sin x) dx$; $I_2 = \int_0^{\pi/2} \sin(\cos x) dx$ and $I_3 = \int_0^{\pi/2} \cos x \, dx$, then

(F) $I_1 > I_2 > I_3$ (T) $I_2 > I_3 > I_1$

(R) $I_3 > I_1 > I_2$ (E) $I_1 > I_3 > I_2$

***Space For Rough Work***

11. The graph of $f(x)=\left|\left(\frac{1}{|x|}-n\right)\right|-n$ is lie in the $(n>0)$

(F) I and II quadrant
(T) I and III quadrant
(R) I and IV quadrant
(E) II and III quadrant

12. $\lim\limits_{x\to a^-}\left(\frac{|x|^3}{a}-\left[\frac{x}{a}\right]^3\right)(a>0)$, where $[*]$ denotes the greatest integer less than or equal to x, is

(F) $a^2-2$
(T) $a^2-1$
(R) $a^2$
(E) $a^2+1$

13. If $g(x)=\begin{cases}\left[f(x)\right], & x\in\left(0,\frac{\pi}{2}\right)\cup\left(\frac{\pi}{2},\pi\right)\\ 3, & x=\frac{\pi}{2}\end{cases}$ where [*] denotes the greatest integer function and

$f(x)=\frac{2(\sin x-\sin^n x)+|\sin x-\sin^n x|}{2(\sin x-\sin^n x)-|\sin x-\sin^n x|}, n\in R,$ then

(F) $g(x)$ is continuous and differentiable at $x=\frac{\pi}{2}$, when $0<n<1$

(T) $g(x)$ is continuous and differentiable at $x=\frac{\pi}{2}$, when $n>1$

(R) $g(x)$ is continuous but not differentiable at $x=\frac{\pi}{2}$, when $0<n<1$

(E) $g(x)$ is continuous but not differentiable, at $x=\frac{\pi}{2}$, when $n>1$

14. If $x^y.y^x=16$, then $\frac{dy}{dx}$ at (2, 2) is

(F) –1
(T) 0
(R) 1
(E) none of these

15. $\int\frac{(x^4-x)^{1/4}}{x^5}dx$ is equal to

(F) $\frac{4}{15}\left(1-\frac{1}{x^3}\right)^{5/4}+c$
(T) $\frac{4}{5}\left(1-\frac{1}{x^3}\right)^{5/4}+c$
(R) $\frac{4}{15}\left(1+\frac{1}{x^3}\right)^{5/4}+c$
(E) none of these

***Space For Rough Work***

16. The value of the definite integral $\int_0^1 \frac{x\,dx}{(x^3+16)}$ lies in the interval $[a,b]$. Then smallest such interval is

(F) $\left[0, \frac{1}{17}\right]$ (T) $[0,1]$

(R) $\left[0, \frac{1}{27}\right]$ (E) None of these

17. If $\int_{-1}^{4} f(x)dx = 4$ and $\int_2^4 (3-f(x))dx = 7$, the value of $\int_2^{-1} f(x)dx$ is

(F) 2 (T) –3

(R) –5 (E) none of these

18. If $f(n) = \frac{1}{n}\left[(n+1)(n+2)(n+3).....(n+n)\right]^{1/n}$ then $\lim_{n\to\infty} f(n)$ equals

(F) e (T) $\frac{1}{e}$

(R) $\frac{2}{e}$ (E) $\frac{4}{e}$

19. Let R be the real line. Consider the following subsets of the plane R x R:

$S = \{(x,y) : y = x+1 \text{ and } 0 < x < 2\}$

$T = \{(x,y) : x - y \text{ is an integer}\}$.

Which one of the following is true?

(F) Both S and T are equivalence relations on R

(T) S is an equivalence relation on R but T is not

(R) T is an equivalence relation on R but S is not

(E) Neither S nor T is an equivalence relation on R

20. Suppose n be an integer greater than 1, let $a_n - \frac{1}{\log_n 2002}$. Suppose $b = a_2 + a_3 + a_4 + a_5$ and $c = a_{10} + a_{11} + a_{12} + a_{13} + a_{14}$. Then $(b-c)$ equals

(F) $\frac{1}{1001}$ (T) $\frac{1}{1002}$

(R) –1 (E) –2

***Space For Rough Work***

## PART-B
## Numerical Type

1. If a continuous function $f(x)$ is symmetric about the line $x=1$ such that $f(x).f(1-x)=1$ and $f'(x)=f'(1-x), f(0)=1$, then $\int_0^2 f(x).f(2-x)dx$ is

2. Let $\int \frac{dx}{x^4(x^2+1)} = f(x)+C$ where $f(1)=\frac{\pi}{4}+\frac{2}{3}$, then $f(1)+f(-1)$ is

3. If $f(x)$ is continuous and $\int_0^9 f(x)dx = 4$, then the value of the integral $\int_0^3 x.f(x^2)dx$ is:

4. Volume of cone with semi vertical angle $\tan^{-1}\frac{1}{3}$ is increasing at a rate of $9\pi$ cm$^3$ / sec when radius of cone is 1 cm. The instantaneous rate of change of height at this time is: (in cm/sec)

5. Number of points of non – differentiability of $f(x)=||x|-1|+|\cos\pi x|; -2<x<2$ is

***Space For Rough Work***

# FIITJEE INTERNAL TEST

## BATCH: NWCMPA425B1_PT1

## PHYSICS, CHEMISTRY & MATHEMATICS

## JEE MAIN-PHASE

Paper Code

## ANSWER KEY

### SECTION – I

### (PHYSICS)

### PART – A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | R | 2. | T | 3. | T | 4. | E |
| 5. | T | 6. | T | 7. | F | 8. | T |
| 9. | R | 10. | E | 11. | F | 12. | T |
| 13. | T | 14. | E | 15. | T | 16. | T |
| 17. | T | 18. | T | 19. | F | 20. | R |

### PART – B

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | 8 | 2. | 63.24 | 3. | 9 | 4. | 0.25 |
| 5. | 3 | | | | | | |

### SECTION – II

### (CHEMISTRY)

### PART – A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | T | 2. | R | 3. | T | 4. | T |
| 5. | T | 6. | R | 7. | R | 8. | R |
| 9. | T | 10. | R | 11. | R | 12. | F |
| 13. | T | 14. | T | 15. | T | 16. | E |
| 17. | R | 18. | E | 19. | F | 20. | F |

### PART – B

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | 5 | 2. | 5 | 3. | 9 | 4. | 4 |
| 5. | 4 | | | | | | |

### SECTION – III

### (MATHEMATICS)

### PART – A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | T | 2. | R | 3. | E | 4. | F |
| 5. | R | 6. | E | 7. | E | 8. | E |
| 9. | F | 10. | E | 11. | F | 12. | R |
| 13. | T | 14. | F | 15. | F | 16. | F |
| 17. | R | 18. | E | 19. | R | 20. | R |

### PART – B

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | 2 | 2. | 0 | 3. | 2 | 4. | 9 |
| 5. | 7 | | | | | | |