

NEW STANDARD ACADEMY

Test Type : Review (Unit Test # 01, 02 & 03)

Do not open this Test Booklet until you are asked to do so. **28-08-23**

JEE(MAIN): 11th Undergoing Students

Read carefully the Instructions on the Back Cover of this Test Booklet.

Important Instructions :

1. Immediately fill in the form number on this page of the Test Booklet with Blue/Black Ball Point Pen. Use of pencil is strictly prohibited.
2. The candidates should not write their Form Number anywhere else (except in the specified space) on the Test Booklet/Answer Sheet.
3. The Test Booklet consists of 90 questions.
4. There are three parts in the question paper 1,2,3 consisting of Physics, Chemistry and Mathematics having 30 questions in each subject and each subject having Two sections. (i) Section-I contains 20 multiple choice questions with only one correct option. Marking scheme : +4 for correct answer, 0 if not attempted and -1 in all other cases. (ii) Section-II contains 10 Numerical Value Type questions. Attempt any 5 questions. First 5 attempted questions will be considered for marking. Marking scheme : +4 for correct answer, 0 if not attempted and -1 in all other cases.
5. Use Blue/Black Ball Point Pen only for writing particulars/markings responses on Side -1 and Side-2 of the Answer Sheet. Use of pencil is strictly prohibited.
6. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electronic device etc, except the Identity Card inside the examination hall/room.
7. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
8. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Room/ Hall. However, the candidate are allowed to take away this Test Booklet with them.

Name of the Candidate(In Capitals) _____

Date of Examination _____

Candidate's Signature: _____

Invigilator's Signature: _____

SECTION-I : (Maximum Marks: 80)

This section contains **20 questions**. Each question has 4 options for correct answer. Multiple-Choice Questions (MCQs) **Only one option is correct**. For each question, marks will be awarded as follows:

Full Marks : +4 If correct answer is selected.

Zero Marks : 0 If none of the option is selected.

Negative Marks : -1 If wrong option is selected.

1. The velocity of a particle is given by the equation

$v = \sqrt{\sin 2t}$. The value of acceleration of particle at $t = \frac{\pi}{4}$ sec is :-

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

2. $\int \left(x + \frac{1}{x}\right) dx =$

- (A) $1 + \log_e x + c$
(B) $\frac{x^2}{2} - \frac{1}{x^2} + c$
(C) $x^2 + \frac{1}{x^2} + c$
(D) $\frac{x^2}{2} + \log_e x + c$

3. Given that : $y = \frac{10}{\sin x + \sqrt{3} \cos x}$. Minimum value of y is

- (A) zero
(B) 2
(C) 5
(D) $10/(1+\sqrt{3})$

4. Rain drop is falling under gravity on the earth surface. Its speed remain constant near the earth surface, this constant speed is known as terminal velocity. This velocity depends on viscosity of air η_0 , radius of drop (r_0), difference in density of water and air (d_0) and acceleration due to gravity (g). Then terminal velocity is :-

[Given that : $F = 6\pi r \eta V_T$]

- (A) $V_T = \frac{2}{9} \frac{r_0^2 g_0}{\eta_0} [d_0]$
(B) $V_T = \frac{2}{9} \frac{r_0 \eta_0}{g} [d_0]$
(C) $V_T = \frac{2}{9} \frac{g_0}{r_0^2 \eta} [d_0]$
(D) $V_T = \frac{2}{9} \frac{g}{r_0 \eta_0} [d_0]$

5. In a hypothetical set of units

1 star joule = 10^3 joule

1 star Newton = 10^4 Newton

1 star second = 10 second

Then one meter is equivalent to

- (A) 100 star meter (B) 1000 star meter
(C) 10 star meter (D) $\frac{1}{10}$ star meter

6. In function $F = \alpha v^2 \sin \beta t$, F denotes force, v velocity and t time. The dimensional formula of $\alpha \beta^2$ is same as dimensional formula of:

- (A) acceleration due to gravity
(B) work done
(C) atmospheric pressure
(D) power

Space for Rough Work

7. A bird starts from (1, 0, 0) in the direction $(2\hat{i} + 3\hat{j} - 6\hat{k})$ with a speed 21 m/s for 5 sec, then along the direction $(3\hat{i} + 4\hat{j} + 5\hat{k})$ with a speed $5\sqrt{2}$ m/s for 5 sec. Find the final displacement of the bird so that it reaches the origin?

- (A) $30\hat{i} + 45\hat{j} - 45\hat{k}$
 (B) $-45\hat{i} - 65\hat{j} + 65\hat{k}$
 (C) $-46\hat{i} - 65\hat{j} + 65\hat{k}$
 (D) $46\hat{i} - 65\hat{j} - 65\hat{k}$

8. Two vector $\vec{a} = 3\hat{i} + 8\hat{j} - 2\hat{k}$ and $\vec{b} = 6\hat{i} + 16\hat{j} + x\hat{k}$ are such that the component of \vec{b} perpendicular to \vec{a} is zero. Then the value of x will be :-

- (A) 8 (B) -4
 (C) +4 (D) -8

9. Motion of a body in x-y plane is $\vec{r} = (2t\hat{i} + (5t^2 + 6t)\hat{j})$ m then component of velocity vector in direction of acceleration at $t = 1$ sec. will be :- (Given $\vec{v} = \frac{d\vec{r}}{dt}$ $\vec{a} = \frac{d\vec{v}}{dt}$)

- (A) $16\hat{j}$ m/s (B) $8\hat{j}$ m/s
 (C) $8\hat{i}$ m/s (D) $20\hat{i}$ m/s

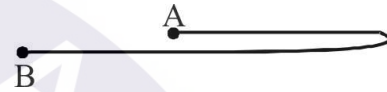
10. A parachutist drops freely from an aeroplane for 10 sec before he open parachute. He then descends with retardation of 2.5 m/s^2 . If he bails out of the plane at height of 2495 m and $g = 10 \text{ m/s}^2$, his velocity on reaching the ground is nearly :-

- (A) 2.5 m/s (B) 7.5 m/s
 (C) 5 m/s (D) 10 m/s

11. An object initially at origin starts from rest and moves along the x axis with a constant acceleration of 4 m/s^2 . Its average velocity as it goes from $x = 2 \text{ m}$ to $x = 8 \text{ m}$ is :

- (A) 1m/s (B) 2m/s
 (C) 3m/s (D) 6m/s

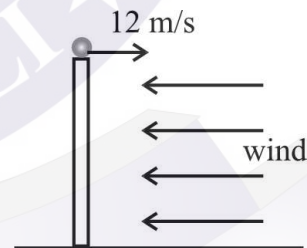
12. A car goes A to B along the path with constant acceleration "a" as shown in figure.



Student-1 infers that initial velocity is positive, acceleration is negative and displacement is positive. Student-2 infers that initial velocity is negative, acceleration is positive and displacement is positive.

- (A) Student-1 is correct
 (B) Student-2 is correct
 (C) Both are correct
 (D) Both are wrong

13. A ball is projected horizontally from the top of tower at 12 m/s as shown in figure, wind is blowing as indicated (horizontally), which causes acceleration 6 m/s^2 horizontally. Displacement of the ball when it strikes the tower, ($g = 10 \text{ m/s}^2$)



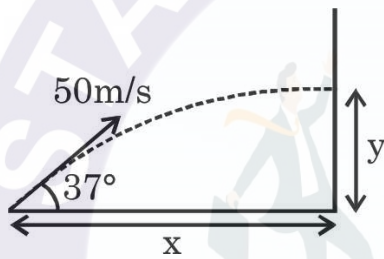
- (A) 20m (B) 60m
 (C) 80m (D) 40m

Space for Rough Work

14. A body of mass m_1 , projected vertically upwards with an initial velocity u reaches a maximum height h . Another body of mass m_2 is projected along an inclined plane making an angle of 30° with the horizontal and with speed u . The maximum distance travelled along the incline is :-

- (A) $2h$ (B) h
 (C) $\frac{h}{2}$ (D) $\frac{h}{4}$

15. A particle is projected as shown in figure. If the particle strikes at the wall after 1 sec, then the ratio $\frac{x}{y}$ will be (approximately)

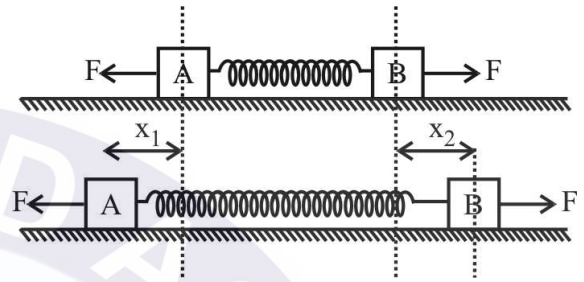


- (A) 1 (B) 1.6
 (C) 2.6 (D) 3

16. A monkey pulls (along the ground) the mid point of a 10 m long light inextensible string connecting two identical objects A & B each of mass 0.3 kg continuously along the perpendicular bisector of line joining the masses. The masses are found to approach each other at a relative acceleration of 5 m/s^2 when they are 6 m apart. The constant force applied by monkey is:

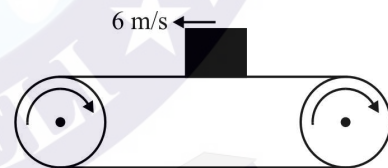
- (A) 4 N
 (B) 2 N
 (C) 3 N
 (D) None

17. Initially spring is relaxed having spring constant 50 N/m. If blocks A and B are displaced by x_1 and x_2 such that $x_1 = 30 \text{ cm}$ & $x_2 = 10 \text{ cm}$ and if force applied by spring on A is F_1 & on B is F_2 then :-



- (A) $F_1 = 15 \text{ N}$; $F_2 = 5 \text{ N}$
 (B) $F_1 = 5 \text{ N}$; $F_2 = 15 \text{ N}$
 (C) $F_1 = 20 \text{ N}$; $F_2 = 20 \text{ N}$
 (D) $F_1 = 15$; $F_2 = 15$

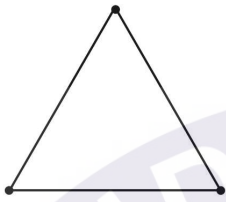
18. A block lying on a long horizontal conveyor belt moving at a constant velocity receives a velocity 6 m/s relative to the ground in the direction opposite to the direction of motion of the conveyor. After $t = 2 \text{ sec}$, the velocity of the block becomes equal to the velocity of the belt. The coefficient of friction between the block and the belt is 0.4. Then the speed of the conveyor belt is :-



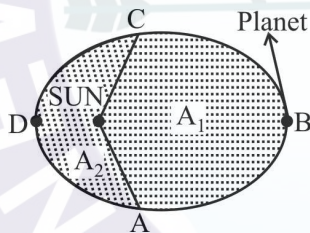
- (A) 1 m/s
 (B) 2 m/s
 (C) 3 m/s
 (D) 6 m/s

Space for Rough Work

19. If the three point masses are released simultaneously to move under influence of mutual gravitational attraction, speed of each particle when each one of them has moved a distance $\left(\frac{a}{2\sqrt{3}}\right)$, is :-



- (A) $\sqrt{\frac{6\sqrt{3} Gm}{(2 - \sqrt{3}) a}}$
 (B) $\sqrt{\frac{2 Gm}{a}}$
 (C) $\sqrt{\frac{Gm}{a}}$
 (D) None of these
20. Time taken by the planet to cover path ABC is t_1 & time taken by the planet to cover path CDA is t_2 .



- (A) $t_1 = t_2$
 (B) $t_2 > t_1$
 (C) $t_1 > t_2$
 (D) cannot be determined

SECTION-II : (Maximum Marks: 20)

This section contains 10 questions Candidates have to attempt any 5 questions out of 10. If more than 5 questions are attempted, then only first 5 attempted questions will be evaluated.

The answer to each question is a **Numerical Value**.

For each question, enter the correct integer value (In case of non-integer value, the answer should be rounded off to the nearest Integer).

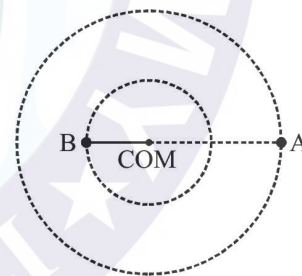
Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4 If correct answer is entered.

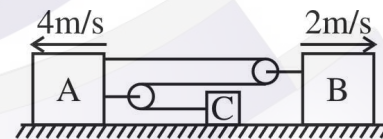
Zero Marks : 0 If the question is unanswered.

Negative Marks : -1 If wrong answer is entered.

1. Figure shows a binary star system revolving about their COM. The masses of star A & B are 15×10^{30} kg and 45×10^{30} kg respectively. Find the ratio of area swept by star A to area swept by star B about their common COM in a common time interval.

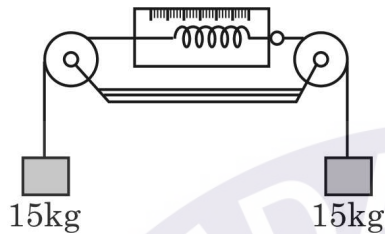


2. Find out speed (in m/s) of block C.

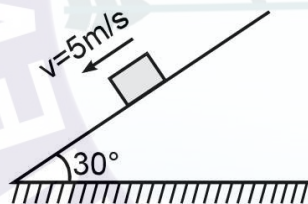


Space for Rough Work

3. As shown in figure two masses 15 kg each are suspended through two strings tied to a spring balance after passing over frictionless pulleys. The reading the balance (in kg) will be :-



4. A body falls freely from the top of a tower. During the last second of its motion, it falls through $\frac{9}{25}$ part of the whole distance. Find the height of the tower in meters.
5. A particle of mass 5 kg is moving on rough fixed inclined plane with constant velocity of 5 m/s as shown in the figure. Find the friction force acting on a body by plane



6. A body is projected horizontally from the top of a building 20 m high. It strikes the ground at an angle of 45° , then the velocity of projection is



7. A projectile at any instant during its flight has velocity 5 m/s at 30° above the horizontal. How long after this instant, will it be moving at right angle to the given direction ?

8. Find the magnitude of vector $\vec{a} = 4\hat{i} - 3\hat{j}$.

9. Find the missing number in the expression given below $A = se^{-\frac{at+1}{A}}$ where s : displacement, t : time , a : acceleration.

10. If $y = x^2$, then $3 \int_0^1 y dx$ will be :

Space for Rough Work

PART-2 : CHEMISTRY

SECTION-I : (Maximum Marks: 80)

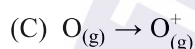
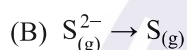
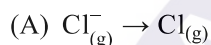
This section contains **20 questions**. Each question has 4 options for correct answer. Multiple-Choice Questions (MCQs) **Only one option is correct**. For each question, marks will be awarded as follows:

Full Marks : +4 If correct answer is selected.

Zero Marks : 0 If none of the option is selected.

Negative Marks : -1 If wrong option is selected.

1. Which process does not absorb energy



(D) Both (A) and (B)

2. Select the **INCORRECT** option

(A) $\text{I.E.}(F) + \text{E.A.}(F) > \text{I.E.}(Cl) + \text{E.A.}(Cl)$

(B) $\text{I.E.}(F) + \text{I.E.}(Cl) > \text{E.A.}(F) + \text{E.A.}(Cl)$

(C) $\text{I.E.}(F) - \text{I.E.}(Cl) < \text{E.A.}(Cl) - \text{E.A.}(F)$

(D) $\text{I.E.}(F) - \text{I.E.}(O) > \text{E.A.}(O) - \text{E.A.}(F)$

3. Which of the following has maximum Ionization Energy ?



4. Which of the following order of I.E_2 is correct.

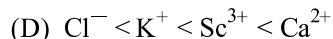
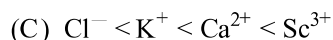
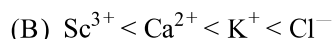
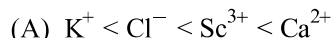
(A) $O > F > N$

(B) $N > F > O$

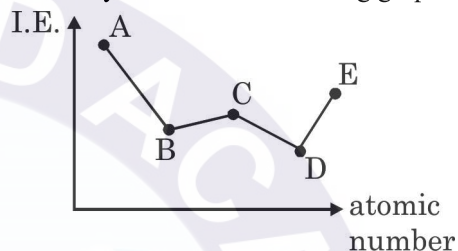
(C) $O > N > F$

(D) $F > O > N$

5. Consider the species Ca^{2+} , Sc^{3+} , K^+ and Cl^- . The correct order of increasing length of their radii is:



6. Carefully observe the following graph.



(A, B, C, D, E are elements of one group)

The above graph is correct for which group of periodic table.

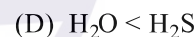
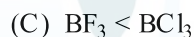
(A) Group : 1

(B) Group : 14

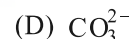
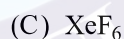
(C) Group : 13

(D) Group : 15

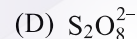
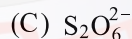
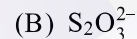
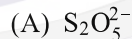
7. In which of the following bond angle order is **CORRECT** ?



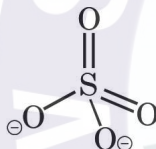
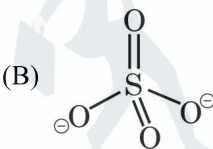
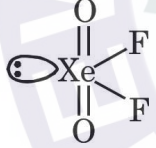
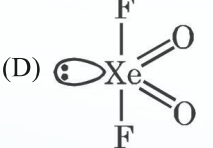
8. Identify the hyper valent compound.



9. Which of the following ion does not have S-S linkage ?



Space for Rough Work

10. Which of the following molecule exhibit intermolecular hydrogen bonding :
- (A) HBr (liquid) (B) Orthoboric acid
(C) Orthonitrophenol (D) Chloral
11. Which of the following would result in the formation of strongest π -bond if the molecular axis is x-axis?
- (A) $2p_x + 2p_y$ (B) $2p_y + 2p_z$
(C) $2p_y + 3d_{xy}$ (D) $2p_z + 4p_z$
12. Which of the following is non-polar as well as planar?
- (A) CH_4 (B) CO_3^{2-} (C) PF_5 (D) SF_2
13. According to VSEPR theory which of the following structure is **INCORRECT** ?
- (A)  (B) 
- (C)  (D) 
14. Due to hydrogen bonding, which of the following molecule(s) do not form ring either in their monomeric form or dimeric form ?
- (A) CH_3COOH (B) Salicylic aldehyde
(C) $\text{C}_6\text{H}_5\text{OH}$ (D) $\text{CCl}_3\text{CHO} \cdot \text{H}_2\text{O}$
15. Boron atom exists in two isotopes B^{11} & B^{10} . Its average atomic mass is 10.8, then percentage of heavier isotope will be :
- (A) 20% (B) 80% (C) 40% (D) 75%
16. Number of gram molecules present in 2.2 gm CO_2 gas is :
- (A) 0.5 (B) 3×10^{23}
(C) 0.05 (D) 3×10^{22}
17. A compound contains equal masses of elements A, B and C which have their atomic masses 20, 40, 60 units in amu respectively. The empirical formula of compound is :
- (A) $\text{A}_2\text{B}_1\text{C}_2$ (B) AB_2C_3
(C) $\text{A}_6\text{B}_3\text{C}_2$ (D) $\text{A}_3\text{B}_2\text{C}$
18. 3 m NaOH solution has a density of 1.10 g/ml. The molarity of the solution is :-
(Molecule wt. of NaOH = 40)
- (A) 2.94 (B) 3.25
(C) 3.64 (D) 1.25
19. 50 ml of 20.8% w/v $\text{BaCl}_2(\text{aq})$ and 100 ml of 9.8% w/v $\text{H}_2\text{SO}_4(\text{aq})$ solution are mixed. Then in final solution : (Atomic weight of Ba = 137)
- (A) $[\text{Cl}^-] = 0.66 \text{ M}$
(B) $[\text{H}^+] = 2.33 \text{ M}$
(C) $[\text{Ba}^{2+}] = 1.0 \text{ M}$
(D) $[\text{SO}_4^{2-}] = 1.33 \text{ M}$
20. An unknown solution [Molecular wt of solute = 250] is 20% $\frac{w}{w}$. Molarity of solution is ..
[Given density of solution = 1.25 g/mL]
- (A) 1 M
(B) 2 M
(C) 3 M
(D) 4 M

Space for Rough Work

SECTION-II : (Maximum Marks: 20)

This section contains 10 questions Candidates have to attempt any 5 questions out of 10. If more than 5 questions are attempted, then only first 5 attempted questions will be evaluated.

The answer to each question is a **Numerical Value**.

For each question, enter the correct integer value (In case of non-integer value, the answer should be rounded off to the nearest Integer).

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

Full Marks : +4 If correct answer is entered.

Zero Marks : 0 If the question is unanswered.

Negative Marks : -1 If wrong answer is entered.

1. A 20 ml mixture of C_2H_4 and C_2H_2 undergoes sparking in gas eudiometer with just sufficient amount of O_2 and shows contraction of 37.5 ml. Volume (in ml) of C_2H_2 in the mixture is.
2. 16 g of SO_x gas occupies 5.6 L at 1 atm and 273 K. What will be the value of x?
3. Find number of moles of Na_3PO_4 which contain as many ions as are present in 1368 gm of $Al_2(SO_4)_3$. (Assuming complete dissociation of salt and no reaction with H_2O)
4. The weight of hydrogen gas obtained from 42 g of CaH_2 by treatment with water is to give calcium hydroxide along with H_2 .
$$CaH_2 + 2H_2O \rightarrow Ca(OH)_2 + 2H_2$$
5. N_2O_4 dissociates into NO_2 , if % dissociation of N_2O_4 is 33.33 %. Calculate average molecular weight of gaseous mixture formed .
Fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.
6. Calculate amount in gram of NaOH required to neutralise a acid mixture of 0.1M, 100 ml of H_2SO_4 and 0.2M, 400 ml of HCl.
7. 50 ml of '20V' H_2O_2 is mixed with 200 ml, '10V' H_2O_2 . The volume strength of resulting solution is (At $0^\circ C$ & 1 atm)
Fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.
8. How many blood cells of 5ml each having $[K^+] = 0.1M$ should burst into 25 ml of blood plasma $[K^+] = 0.02 M$ so as to give final $[K^+] = 0.06 M$
9. The number of species which are diamagnetic amongst the following
 Fe^{2+} , Fe^{4+} , Mn^{2+} , Cr^{3+} , Ni^{2+} , Cr^{+6} , Mn^{+7} , V^{3+} , Sc^{3+}
10. Calculate the maximum number of electrons in nitrogen atom for which $n + s = 1.5$

Space for Rough Work

PART-3 : MATHEMATICS

SECTION-I : (Maximum Marks: 80)

This section contains **20 questions**. Each question has 4 options for correct answer. Multiple-Choice Questions (MCQs) **Only one option is correct**. For each question, marks will be awarded as follows:

Full Marks : +4 If correct answer is selected.

Zero Marks : 0 If none of the option is selected.

Negative Marks : -1 If wrong option is selected.

- If $P(x)$ is a polynomial of degree 5 with leading coefficient unity such that $P(1) = 1, P(2) = 4, P(3) = 9, P(4) = 16$ & $P(5) = 25$, then $P(6)$ is:
(A) 36 (B) 156
(C) 120 (D) 126
- If $(x^2 - 1)^3 - (2x - 1)^3 = x^3(x - 2)^3$, then sum of all roots of the equation is :
(A) -1 (B) 2
(C) 2.50 (D) 1.50
- The number of real value(s) of 'x' satisfying the equation $(x^2 - 1)^{x^2 - 2x + 2} = (x^2 - 1)^x$
(A) 6 (B) 5
(C) 4 (D) 3
- Product of roots of the equation $(\log_a x)^3 - 12(\log_a x)^2 + 44\log_a x - 48 = 0$ is 64, then a is
(A) $\sqrt{2}$ (B) $\sqrt{3}$
(C) 2 (D) 3
- If $\frac{x}{y} + \frac{y}{z} + \frac{z}{x} = 8$ and $\frac{y}{x} + \frac{z}{y} + \frac{x}{z} = 6$, then the value of $\frac{x^3}{y^3} + \frac{y^3}{z^3} + \frac{z^3}{x^3}$ is
(A) 271 (B) 360
(C) 371 (D) 390
- If $a + b + c = 2, ab + bc + ca = 3$ and $abc = 4$, then the value of $a^4 + b^4 + c^4$ is equal to
(A) 15 (B) 16
(C) 17 (D) 18
- Sum of values of x which satisfies the equation $18(9^x) - 35(6^x) + 12(4^x) = 0$.
(A) 2 (B) 1
(C) 0 (D) -1
- If $a, b \in \mathbb{R}, a^3 - 3ab^2 = 11$ and $b^3 - 3a^2b = 2$, then the value of $a^2 + b^2$ is -
(A) 5 (B) 13
(C) 125 (D) 25
- Number of integers in range of $x^2 - 5|x| + 1, x \in [-4, 2]$ is :-
(A) 7 (B) 5
(C) 6 (D) 8
- If a, b, c be the sides of a triangle where $a \neq b \neq c$ then the roots of the equation $x^2 + (a + b + c)x + ab + bc + ca = 0$ are
(A) real and integers
(B) imaginary
(C) real and irrational
(D) None of these

Space for Rough Work

11. The value of a for which square of difference of roots of equation $x^2 - (a - 2)x - a - 1 = 0$ assumes the least value is
- (A) 1 (B) 0
(C) 3 (D) 2
12. $ax^5 + bx^4 + 1$ is divisible by $x^2 - x - 1 = 0$, then the value of a is
- (A) 1 (B) 2
(C) 3 (D) None of these
13. If $\left| \frac{x^2 + mx + 1}{x^2 + x + 1} \right| < 3$ for all real x , then
- (A) $m < -1$
(B) $-1 < m < 5$
(C) $m > 7$
(D) $m > 9$
14. If α, β are roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ then the number of integral values of m for which $\alpha, \beta \in (-2, 4)$ is
- (A) 0 (B) 1
(C) 2 (D) 3
15. If $\left| \frac{x}{x-1} \right| + |x| = \frac{x^2}{|x-1|}$, then set of values of x is
- (A) $\{0\} \cup (1, \infty)$
(B) $(-\infty, -3) \cup \left(\frac{7}{3}, \infty\right)$
(C) $[2, \infty)$
(D) None of these
16. Greatest integral value of a for which $x^2 + 2ax + 10 - 3a > 0 \forall x \in \mathbb{R}$ is-
- (A) 1
(B) 2
(C) 3
(D) 5
17. If $\sum_{r=1}^{11} r \cdot 5^r = \frac{(43 \times 5^a + 5)}{b}$, then $(a + b)$ is
- (A) 18
(B) 28
(C) 15
(D) 38
18. Let $S_n(x) = \log_{a^{1/2}} x + \log_{a^{1/3}} x + \log_{a^{1/6}} x + \log_{a^{1/11}} x + \log_{a^{1/8}} x + \log_{a^{1/27}} x + \dots$ up to n -terms, where $a > 1$. If $S_{24}(x) = 1093$ then value of $8 \log_a x$ is equal to _____.
- (A) 2 (B) 3
(C) 4 (D) 5
19. $\cot 12^\circ \cot 102^\circ + \cot 102^\circ \cot 66^\circ + \cot 66^\circ \cot 12^\circ$ is
- (A) -2 (B) 1
(C) -1 (D) 2
20. If $4\sin 2\theta + 4\operatorname{cosec} 2\theta = 17$, then the value of $\tan \theta$ can be -
- (A) $4 + \sqrt{3}$
(B) $4 - \sqrt{3}$
(C) $4 + \sqrt{15}$
(D) 4

Space for Rough Work

SECTION-II : (Maximum Marks: 20)

This section contains 10 questions Candidates have to attempt any 5 questions out of 10. If more than 5 questions are attempted, then only first 5 attempted questions will be evaluated.

The answer to each question is a **Numerical Value**.

For each question, enter the correct integer value (In case of non-integer value, the answer should be rounded off to the nearest Integer).

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

Full Marks : +4 If correct answer is entered.

Zero Marks : 0 If the question is unanswered.

Negative Marks : -1 If wrong answer is entered.

1. The value of $\left| 4 \left(2\cos^3 \frac{\pi}{7} - \cos^2 \frac{\pi}{7} - \cos \frac{\pi}{7} \right) \right|$ is
2. The maximum value of the expression $\frac{1}{\sin^2 \theta + 3 \sin \theta + 5 \cos^2 \theta}$
3. Product of real roots of the equation $(x + 1)(x + 2)^2(x + 4) - 2x^2 = 0$ is
4. Let $x, y, z > 0$ satisfy $xyz = 10^{18}$ and $\log_{10} \left(\frac{x}{y} \right) \cdot \log_{10} \left(\frac{y}{z} \right) + \log_{10} \left(\frac{z}{x} \right) \cdot \log_{10} \left(\frac{x}{z} \right) = -6$.
If $N = \log_{10}^3 x + \log_{10}^3 y + \log_{10}^3 z - 3 \log_{10} x \cdot \log_{10} y \cdot \log_{10} z$
then characteristic of $\log_{10} N$ is :-
5. The real root of equation $8x^3 - 3x^2 - 3x - 1 = 0$ can be written in the form $\frac{\sqrt[3]{m} + \sqrt[3]{n} + 1}{p}$, where m, n & p are positive integers, then value of $m + n + p$ is -

6. If α, β are roots of the equation $x^2 + 5(\sqrt{2})x + 10 = 0$, $\alpha > \beta$ and $P_n = \alpha^n - \beta^n$ for each positive integer n , then the value of $\left(\frac{P_{17}P_{20} + 5\sqrt{2}P_{17}P_{19}}{P_{18}P_{19} + 5\sqrt{2}P_{18}^2} \right)$ is equal to _____.
7. Consider the arrangement

1						
2	3	4				
5	6	7	8	9		
10	11	12	13	14	15	16

 and so on, then 2nd term of 15th row is
8. The sum of the series $\frac{18}{3^2 + 1} + \frac{18}{4^2 + 2} + \frac{18}{5^2 + 3} + \dots \infty$ is S , then the value of $2S$ is
9. Let S_n denotes the sum of n terms of an A.P. If $S_{2n} = 3S_n$, then ratio $\frac{S_{3n}}{S_n} =$
10. If $4 \cos 63^\circ = \sqrt{a + \sqrt{5}} - \sqrt{b - \sqrt{5}}$ where a and b are coprime numbers then the value of $(a + b)$ is

Space for Rough Work