JEE Main - 2 | JEE 2024

Date: 31/08/2022   Maximum Marks: 300

Timing: 04:00 PM to 07:00 PM

General Instructions

1. The test is of **3 hours** duration and the maximum marks is **300.**

2. The question paper consists of **3 Parts** (Part I: **Physics**, Part II: **Chemistry**, Part III: **Mathematics**). Each Part has **two** sections (Section 1 & Section 2).

3. **Section 1** contains **20 Multiple Choice Questions**. Each question has 4 choices **(A)**, **(B)**, **(C)** and **(D)**, out of which **ONLY ONE CHOICE** is correct.

4. **Section 2** contains **5 Numerical Value Type Questions**. The answer to each question is an **integer** ranging from 0 to 99.

5. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.

6. Rough work is to be done on the space provided for this purpose in the Test Booklet only.

7. On completion of the test, the candidate must hand over the Answer Sheet to the **Invigilator** on duty in the Room/Hall. **However, the candidates are allowed to take away this Test Booklet with them**.

8. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Marking Scheme

1. **Section – 1:** +4 for correct answer, –1 (negative marking) for incorrect answer, 0 for all other cases.

2. **Section – 2:** +4 for correct answer, –1 (negative marking) for incorrect answer, 0 for all other cases.

Name of the Candidate (In CAPITALS) : -

Roll Number : -

OMR Bar Code Number : -

Candidate's Signature : - - - - - - - - - - - - - - - - - - Invigilator's Signature - - - - - - - - - - - - -

Syllabus

Physics: Vectors & forces (Including relative velocity), Kinematics of a particle
Chemistry: Stoichiometry-I, Atomic structure
**Mathematics:** Quadratic Equations, Trigonometry

PART - I : PHYSICS 100 MARKS

SECTION-1

This section contains 20 Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE CHOICE is correct.

1. The maximum deceleration of a car is 5 m/s^2. If it is moving at 20 m/s, the minimum time in which it can stop is:
(A) 0.25 s (B) 0.5 c (C) 4 s (D) 2 s

2. Three coplanar vectors $\vec{A}, \vec{B}$ and $\vec{C}$ have magnitudes 4, 3 and 2 respectively. If angle between any two vectors is 120° then which of the following vector may be equal to $\dfrac{3\vec{A}}{4} + \dfrac{\vec{B}}{3} + \dfrac{\vec{C}}{2}$?


(A) ↗ (B) → (C) ↘ (D) ↑
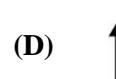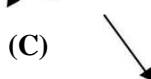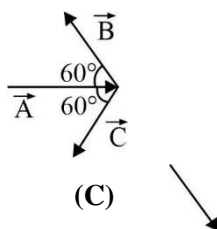
3. The velocity (v) of a particle moving along x-axis varies with its position x as shown in figure. The acceleration (a) of particle varies with position (x) as :
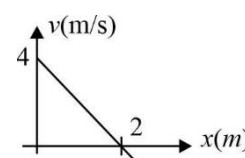

(A) $a^2 = x+3$ (B) $a = 2x^2 + 4$
(C) $a = 4x - 8$ (D) $2a = 3x+5$

4. Water drops are falling down at regular time intervals from ceiling such that when 1st drop is about to hit the ground the nth drop is starting from the ceiling as shown. If H_1 is vertical distance between the ceiling and ground then the distance of rth drop from the ceiling is given by:
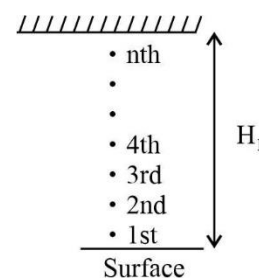

(A) $\dfrac{(n-r)H_1}{(n-1)}$ (B) $\dfrac{(n-r)^2 H_1}{(n-1)^2}$

(C) $\dfrac{rH_1}{n}$ (D) $\dfrac{r^2 H_1}{n^2}$

5. The velocity-time graph of a bus is shown in figure. Its displacement-time graph is:

(A) (B)

(C) (D)
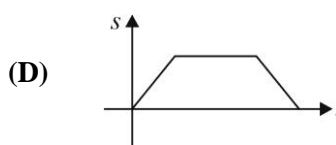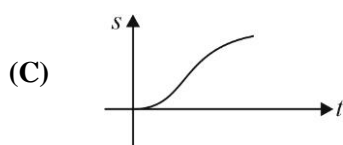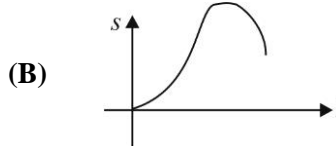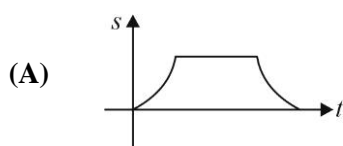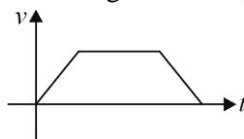
6. An elevator is moving upward with constant acceleration. The dashed curve in the given figure shows the position *y* of the ceiling of the elevator from ground as a function of time *t*. At the instant indicated by the point P a bolt breaks loose and drops from celling. Which of the solid curve shown best describes the position of the bolt as a function of time as seen from ground?
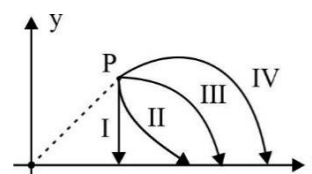

(A) I **(B)** II **(C)** III **(D)** IV

7. For which of the paths mentioned below, magnitude of average velocity = average speed?
(A) Circular motion
(B) Parabolic motion
(C) Straight line motion without changing direction
(D) Straight line motion if particle turns and comes back to a certain distance

8. A particle is moving with speed 6m/s along the direction of $\vec{A} = 2\hat{i} + 2j - k,$ then its velocity is:

(A) $\left(4\hat{i} + 2j - 4k\right)$ units **(B)** $\left(4\hat{i} + 4j - 2k\right)$ units

(C) $\left(4\hat{i} + 4j - 4k\right)$ units **(D)** $\left(2\hat{i} + 4j - 2k\right)$ units

9. Find the maximum mass m so that the system remains in equilibrium. [Assume ideal string and pulley.]
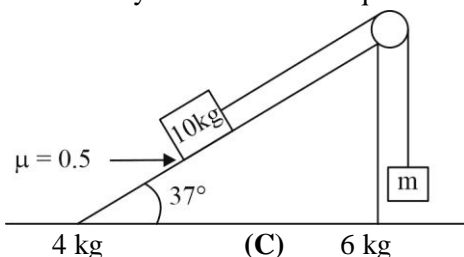
(A) 10 kg **(B)** 4 kg **(C)** 6 kg **(D)** 14 kg

10. If the sum of two unit vectors, is a unit vector, then magnitude of their difference is:

(A) $\sqrt{2}$ **(B)** $\sqrt{3}$ **(C)** $\dfrac{1}{\sqrt{2}}$ **(D)** $\sqrt{5}$

11. A man standing on a road has to hold his umbrella at 30° with the vertical to protect himself from the rain. He throws the umbrella and starts running at 30 km/h. He finds that rain drops are hitting his head vertically. What is the speed of rain with respect to the road?

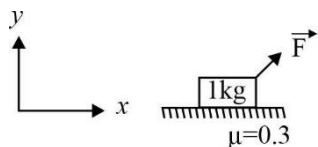**(A)** 40 km/h **(B)** 60 km/h **(C)** $\dfrac{40}{\sqrt{3}}$ km/h **(D)** $20\sqrt{3}$ km/h
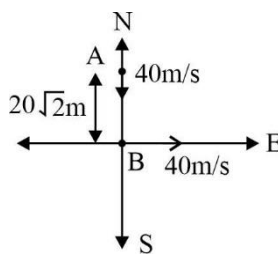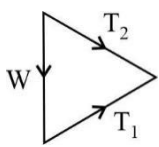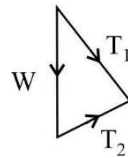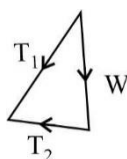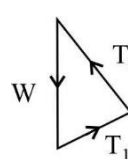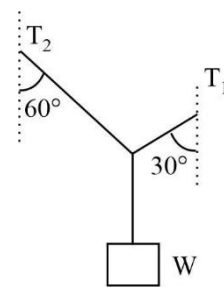
12. A sphere of mass m is kept between two inclined surfaces, as shown in the figure. If the co-efficient of friction between each wall and the sphere is zero, then the ratio of normal reaction $\left(N_1 / N_2\right)$ offered by the wall 1 and 2 on the surface of sphere will be:

(A) $\tan\theta$ **(B)** $\tan 2\theta$
(C) $2\cos\theta$ **(D)** $\cos 2\theta$
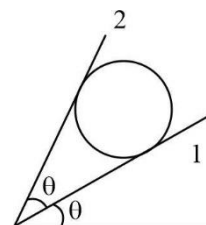
13. The sum, difference and cross product of two vectors $\vec{A}$ and $\vec{B}$ are mutually perpendicular if:
(A) $\vec{A}$ and $\vec{B}$ are any two vectors
(B) $\vec{A}$ and $\vec{B}$ are perpendicular to each other but magnitude are arbitrary
(C) Modulus of $\vec{A}$ = modulus of $\vec{B}$ and they must be perpendicular to each other
(D) Modulus of $\vec{A}$ = modulus of $\vec{B}$ and their directions are arbitrary

14. A body falls from a certain height. Two seconds later another body falls from the same height. How long after the beginning of motion of the first body, the distance between the bodies becomes twice the distance at the moment the second body starts to fall? (Take $g = 10 \text{ m/s}^2$)

(A)   3sec   (B)   10sec   (C)   15sec   (D)   20sec

15. A particle is released from rest from a tower of height $3h$. The ratio of times to fall equal heights h, i.e., $t_1 : t_2 : t_3$ is:

(A) $\sqrt{3} : \sqrt{2} : 1$

(B) $3 : 2 : 1$

(C) $9 : 4 : 1$

(D) $1 : (\sqrt{2} - 1) : (\sqrt{3} - \sqrt{2})$

16. A force $\vec{F} = \hat{i} + 4j$ acts on block as shown. The force of friction acting on the block is:

(A) $-\hat{i}$

(B) $-1.8\hat{i}$

(C) $-2.4\hat{i}$

(D) $-3\hat{i}$

17. A point traversed half the distance with velocity v_0. The remaining part of the distance was covered with velocity v_1 for half the time and with velocity v_2 for the other half of the time. The mean velocity of the point averaged over the whole time of motion is:

(A) $\dfrac{2v_0(v_1 + v_2)}{v_0 + v_1 + v_2}$

(B) $\dfrac{2v_0(v_1 + v_2)}{2v_0 + v_1 + v_2}$

(C) $\dfrac{v_0(v_1 + v_2)}{v_0 + v_1 + v_2}$

(D) $\dfrac{3v_0(2v_1 + 2v_2)}{3v_0 + 2v_1 + v_2}$

18. A car A is heading towards origin from North with speed 40m/s. Another car B is moving towards East from origin with the same speed. The minimum separation between the two particle will occur at $t = ?$

(A) $\dfrac{1}{\sqrt{2}} \sec$

(B) $\dfrac{1}{2\sqrt{2}} \sec$

(C) $\dfrac{1}{2} \sec$

(D) $\dfrac{1}{4} \sec$

19. A weight W is supported by two strings inclined at 60° and 30° to the vertical. The tensions in the strings are T_1 and T_2 as shown. If these tensions are to be determined in terms of W using triangle of forces, which of these triangle represents the best (Block is in equilibrium).

(A)

(B)

(C)

(D)

20. Position of a particle moving rectilinearly is varying with time as $x = 10 + 10t - t^2$. Find distance moved by particle in 6 sec.

(A)   34m   (B)   35m   (C)   26m   (D)   36m

SPACE FOR ROUGH WORK

SECTION-2

This section contains Five (05) Numerical Value Type Questions. The answer to each question is an integer ranging from 0 to 99 (both inclusive).

1. A particle performs uniform circular motion with a speed of π m/s along a circle of radius $2\pi \, m$. Find the magnitude of average velocity (in m/s) for half revolution.

2. A river is flowing with a speed of $1 km \, h^{-1}$. A swimmer wants to go to point C starting from A. He swims with a speed of $5 \, km \, h^{-1}$ at an angle θ w.r.t. the river flow. If AB = BC = 400 m, at what angle (in degrees) with the river bank should the swimmer swim? $\left(\sin 37° \approx \dfrac{3}{5} \right)$
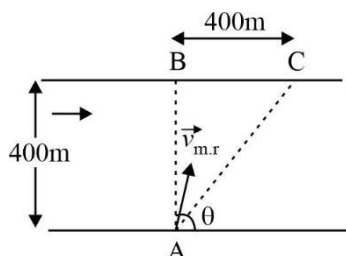
3. Two trains are moving in opposite direction on same track. When their separation was 600m their drivers notice the mistake and start slowing down to avoid collision. Graphs of their velocities as function of time is as shown. If separation between the drivers when first train stops is x m then find the value of $\dfrac{x}{16}$.
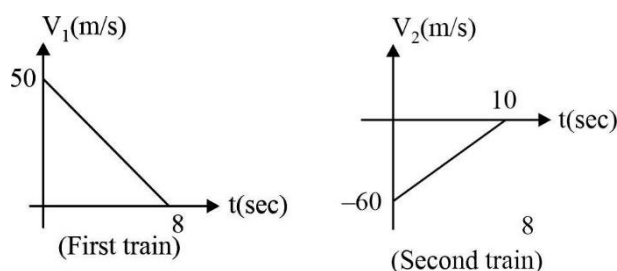
4. A stone is dropped from a 20 m high balcony. Find the velocity (in m/s) with which the stone strikes the ground. [Take $g = 10$ m/s^2]

5. Six particles situated at corners of a regular hexagon of side 1m start moving at a constant speed of 2 m/s. Each particle maintains its direction towards the particle at next corner. Calculate the time (in s) the particles will take to meet each other.

SPACE FOR ROUGH WORK

PART - II : CHEMISTRY   **100 MARKS**

SECTION-1

This section contains 20 Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE CHOICE is correct.

1. Given below are two statements.

Statement-I : The square of the wave function (ψ^2) at a point gives the probability density of the electron at that point.

**Statement-II :** The curves for variations of (ψ^2) as a function of r for 1s and 2s orbitals are same.

In the light of above statements, choose the correct answer from the options given below.
(A) Both Statement-I and Statement-II are correct
(B) Both Statement-I and Statement-II are incorrect
(C) Statement-I is correct but Statement-II is incorrect
(D) Statement-I is incorrect but Statement-II is correct

2. Given below are two statements: one is labelled as Assertion A and, the other is labelled as Reason R.
Assertion A : For $\ell = 2$, the orbital is known as d-orbital and minimum value of principal quantum number has to be 3.
Reason R : The value of ℓ cannot be greater than $n-1$.
In the light of above statements, choose the most appropriate answer from the options given below.
(A) Both A and R are correct, and R is correct explanation of A
(B) Both A and R are correct, but R is NOT the correct explanation of A
(C) A is correct but R is not correct
(D) A is not correct but R is correct

3. Which of the following is/are correct?
(a) Bohr orbits have no real meaning.
(b) Existence of Bohr orbits can be demonstrated experimentally.
(c) An orbital refers to the one electron wave function and has no physical meaning.
(d) Each orbital in an atom is defined by a set of values for n, ℓ and m_ℓ.

Choose the correct answer from the options given below.
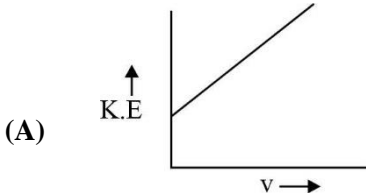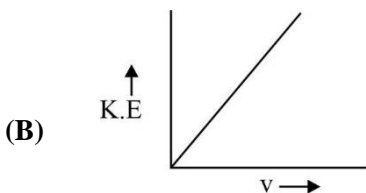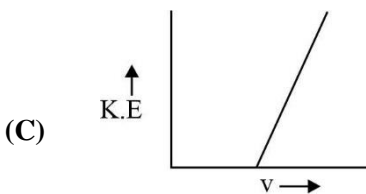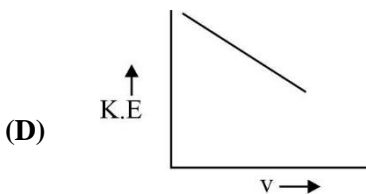**(A)** a, b, d   **(B)** a, b   **(C)** a, c, d   **(D)** a, b, c, d

4. Consider the following curves and identify that which is correct manifestation of quantum nature of atoms?
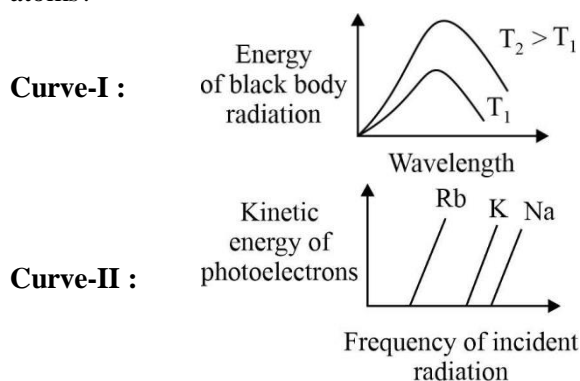
(A) Neither curve-I nor curve-II   **(B)** Both curves-I and II
(C) Only curve-I   **(D)** Only curve-II

5. If in ground state number of unpaired electrons in $Mn^{+7} = a$, Number of d-subshell electrons in Cr = b. Find the value of (a + b)
(Atomic no. of Mn = 25, Cr = 24)
(A) 12   (B) 9   (C) 11   (D) 5

6. During an experiment, an α- particle and a proton are accelerated by same potential difference, their de-Broglie wavelength ratio will be: (Take mass of proton = mass of neutron)
(A) $1:2$ (B) $1:4$ (C) $1:2\sqrt{2}$ (D) $1:\sqrt{2}$

7. A chloride salt of rhenium contains 63.6% Re by mass. What is its empirical formula?
(Atomic mass of Re : 186 amu, Cl = 35.5 amu)
(A) $ReCl$ (B) $ReCl_2$ (C) $ReCl_3$ (D) $ReCl_5$

8. According to the equation $SnO_2 + 2H_2 \rightarrow Sn + 2H_2O$
What volume of hydrogen, measured at 1 atm and 273K, is required to react with 2.00g of SnO_2? (Atomic mass of Sn: 119 amu, O = 16 amu)
(A) 0.00133L   (B) 0.00265L   (C) 0.297L   (D) 0.593L

9. The density of a liquid is 1.2g/mL. There are 350 drops in 20 mL. The number of molecules in 1 drop is: (Molecular weight of liquid = 70u)
(A) $\frac{1.2}{35}N_A$ (B) $\left(\frac{1}{35}\right)^2 N_A$ (C) $\frac{1.2}{(35)^2}(N_A)$ (D) $1.2N_A$

10. In the reaction $4A + 2B + 3C \longrightarrow A_4B_2C_3$, what will be the number of moles of product formed starting from 1 mole A, 0.6 mol of B and 0.72 mol of C?
(A) 0.25   (B) 0.3   (C) 0.24   (D) 2.32

11. 20g sample of $Ba(OH)_2$ is dissolved in 10 ml of 0.5 N HCl solution. The excess of HCl was titrated with 0.2N NaOH. The volume of NaOH used was $10cm^3$. Calculate the percentage of $Ba(OH)_2$ in the sample. $\left(M_0 \text{ of } Ba(OH)_2 = 171g/mol\right)$
(A) 2.56%   (B) 1.28%   (C) 0.855%   (D) 2.13%

12. 20 ml 1M HCl, 30 ml 2M H_2SO_4 and 10 ml 3M NaOH solutions are mixed together. What is the normality of the final solution with respect to H^+ ions?
(A) 2.83 N   (B) 1.83 N   (C) 2.33N   (D) 3.83N

13. 20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample?
$\left(M_0 \text{ of } Mg = 24g, C = 12g, O = 16g\right)$
(A) 60   (B) 84   (C) 75   (D) 96

14. Which of the following is correctly matched?

	Ion/atom	Ionization energy
(A)	H	54.16eV
(B)	He^+	13.6eV
(C)	Li^{2+}	122.4eV
(D)	Be^{3+}	254.4eV

15. The vapour of Hg absorb some electrons accelerated by a potential difference of 4.5 volts from rest as a result of which light is emitted. If the full energy of a single incident electron is supposed to be converted into light emitted, find the wave number $\left(\dfrac{1}{\lambda}\right)$ of the light.

[**Given that:** $h = 6.6\times10^{-34}$ J - sec, $C = 3\times10^{8}$ m / sec, $1eV = 1.6\times10^{-19}$ J]

(A) $3.63\times10^{6}\,m^{-1}$ (B) $5.93\times10^{6}\,m^{-1}$ (C) $5.93\times10^{6}\,cm^{-1}$ (D) $6.62\times10^{6}\,m^{-1}$

16. A metal surface is illuminated by light of wavelength 310 nm and 232.5 nm such that ratio of maximum K.E. of the ejected photoelectrons will be 1 : 2. If $hc = 1240\,eV$ - nm then work function of the metal is:

(A) 2.67 eV   (B) 3.53 eV   (C) 4.20 eV   (D) 1.89 eV

17. Bond dissociation energy of Cl_2 is 240 kJ/mol. The longest wavelength of photon that can break this bond would be: $\left[N_A = 6\times10^{23}, h = 6.6\times10^{-34}\,J/s \right]$

(A) $4.95\times10^{-7}\,m$

(B) $9.9\times10^{-7}\,m$

(C) $4.95\times10^{-6}\,m$

(D) $9.9\times10^{-6}\,m$

18. The electrons identified by quantum numbers n and *l*:

(1) $n = 4, l = 1$ (2) $n = 4, l = 0$ (3) $n = 3, l = 2$ (4) $n = 3, l = 1$

Can be placed in order of increasing energy as:

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

19. According to Einstein's photoelectric equation, the graph between the kinetic energy of photoelectrons ejected and frequency of incident radiation is:

(A)

(B)

(C)

(D)

20. The mole fraction of a solute in aqueous solution is 0.1. At 298K, molarity of this aqueous solution is the same as its molality. Density of this solution at 298K is 2.0 gcm^{-3}. The molecular weight of the solute is:

(A) 18 g/mole   (B) 9 g/mole   (C) 81 g/mole   (D) 162 g/mole

SPACE FOR ROUGH WORK

SECTION-2

This section contains Five (05) Numerical Value Type Questions. The answer to each question is an integer ranging from 0 to 99 (both inclusive).

1.   How many of the following statements is/are correct?

   (a)   The shapes of the five d-orbitals are similar to each other.

   (b)   The probability density function in case of d_{xy} orbital is zero at the two planes passing through the origin and bisecting the xy plane containing z-axis.

   (c)   The number of 3d electrons in copper (Z = 29) are twice of the 3d electrons of chromium (Z = 24).

   (d)   The extra stability of d^5 (half filled) and d^{10} (completely filled) subshell is due to smaller coulombic repulsion energy and smaller exchange energy.

2. $x \times 10^{-2}$ gm of $CaCO_3$ is required to react completely with 25 mL of 0.2 M H_3PO_4 to form $Ca_3(PO_4)_2$. Find the value of x _____.

3.   The orbital angular momentum of an electron in $3p$ orbital is $\sqrt{x}\ \dfrac{h}{2\pi}$. The value of x is _____.

4.   Maximum number of possible spectral lines which may be emitted in Brackett series from a sample of H atoms, if electron present in 9th excited level returns to ground level, are _____.

5.   6.0 moles of $Fe_2O_3(s)$ reacts with 9.0 moles of carbon in a blast furnace according to the equation given below. $Fe_2O_3(s) + 3C(s) \rightarrow 2Fe(s) + 3CO(g)$. What is the theoretical yield of Fe in moles?

SPACE FOR ROUGH WORK

PART - III : MATHEMATICS   100 MARKS

SECTION-1

This section contains 20 Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE CHOICE is correct.

1. If the following figure shows the graph of $f(x) = ax^2 + bx + c$, then :

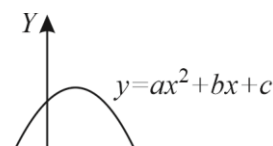I. $ac < 0$ II. $bc > 0$

III. $ab > 0$ IV. $abc < 0$

The correct choice is:

(A) I, II   (B) II, III

(C) I, II, IV   (D) I, II, III

2. The value of $\sin \dfrac{\pi}{n} + \sin \dfrac{3\pi}{n} + \sin \dfrac{5\pi}{n} + \dots\dots$ to n terms is equal to:

(A) 1   (B) 0   (C) $\dfrac{n}{2}$ (D) 2

3. If the roots, α and β of the equation $\dfrac{x^2 - bx}{ax - c} = \dfrac{\lambda - 1}{\lambda + 1}$ are such that $\alpha + \beta = 0$, then the value of λ is :

(A) $\dfrac{a-b}{a+b}$ (B) c (C) $\dfrac{1}{c}$ (D) $\dfrac{a+b}{a-b}$

4. $\left(\cos \dfrac{\pi}{12} - \sin \dfrac{\pi}{12} \right)\left(\tan \dfrac{\pi}{12} + \cot \dfrac{\pi}{12} \right) =$

(A) $2\sqrt{2}$ (B) $4\sqrt{2}$ (C) $\sqrt{2}$ (D) $\dfrac{1}{\sqrt{2}}$

5. If one root of the equation $(a-b)x^2 + ax + 1 = 0$ is double the other and if a is real, then the greatest value of b is :

(A) $\dfrac{7}{6}$ (B) $\dfrac{8}{7}$ (C) $\dfrac{9}{8}$ (D) $\dfrac{10}{9}$

6. Let $f(x)$ be a quadratic polynomial such that $f(-2) + f(3) = 0$. If one of the roots of $f(x) = 0$ is -1, then the sum of the roots of $f(x) = 0$ is equal to:

(A) $\dfrac{11}{3}$ (B) $\dfrac{7}{3}$ (C) $\dfrac{13}{3}$ (D) $\dfrac{14}{3}$

7. If a ΔPQR, if $3\sin P + 4\cos Q = 6$ and $4\sin Q + 3\cos P = 1$, then the angle R is equal to :

(A) $\dfrac{\pi}{4}$ (B) $\dfrac{3\pi}{4}$ (C) $\dfrac{5\pi}{6}$ (D) $\dfrac{\pi}{6}$

8. $16\sin(20°)\sin(40°)\sin(80°)$ is equal to:

(A) $\sqrt{3}$ (B) $2\sqrt{3}$ (C) 3 (D) $4\sqrt{3}$

9. If $f(\theta) = \sin^4 \theta + \cos^4 \theta + 1$, then range of $f(\theta)$ is:

(A) $\left[\dfrac{3}{2}, 2 \right]$ (B) $\left[1, \dfrac{3}{2} \right]$ (C) $[1, 2]$ (D) $[0, 5]$

10. The equation formed by decreasing each root of $ax^2 + bx + c = 0$ $(a \neq 0)$ by 1 is $2x^2 + 8x + 2 = 0$, then:

(A) $a = -b$ (B) $b = -c$ (C) $c = -a$ (D) $b = a + c$

11. If both roots of the equation $x^2 - 2ax + a^2 - 1 = 0$ lie between $(-2, 2)$ then a lies in the interval:

(A) $(-\infty, -3) \cup (3, \infty)$ (B) $(3, \infty)$

(C) $(-1, 1)$ (D) $(-\infty, -3) \cup (-1, 1) \cup (3, \infty)$

12. If $\dfrac{\cos \theta}{p} = \dfrac{\sin \theta}{q}$, then $\dfrac{p}{\sec 2\theta} + \dfrac{q}{\operatorname{cosec} 2\theta} =$

(A) p (B) q (C) pq (D) $\dfrac{p}{q}$

13. The number of solutions of equation $\sin \theta + \cos \theta = \dfrac{1}{2}$ in $\theta \in \left[0, \dfrac{\pi}{2}\right]$ is:

(A) 0 (B) 1 (C) 2 (D) More than 2

14. The roots of the equation $|x^2 - x - 6| = x + 2$ are given by:

(A) $-2, 2, 4$ (B) $0, 1, 4$ (C) $-2, 1, 4$ (D) $0, 2, 4$

15. If $\sec \theta = a + \dfrac{1}{4a}$ $(a \geq 1)$, then $\sec \theta + \tan \theta$ is:

(A) a (B) $2a$ (C) $3a$ (D) $4a$

16. $\left(\cos^4 \dfrac{\pi}{24} - \cos^4 \dfrac{13\pi}{24}\right)$ equals:

(A) $\dfrac{1}{\sqrt{2}}$ (B) $\dfrac{\sqrt{6} - \sqrt{2}}{4}$ (C) $\dfrac{\sqrt{6} + \sqrt{2}}{4}$ (D) $\dfrac{\sqrt{3} + 1}{2}$

17. Sum of values of p such that $3x^2 - 2x + p = 0$ and $6x^2 - 17x + 12 = 0$ have a common root is :

(A) $\dfrac{77}{12}$ (B) $-\dfrac{77}{12}$ (C) $\dfrac{13}{12}$ (D) $-\dfrac{13}{12}$

18. If $\tan A$ and $\tan B$ are roots of quadratic equation $x^2 - 6x + 4 = 0$, (A, B are distinct values lying in $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$), then $\tan^2(A - B) =$

(A) 16 (B) $\dfrac{16}{25}$ (C) $\dfrac{4}{5}$ (D) 4

19. $\tan(100°) + \tan(1925°) + \tan(3700°)\tan(125°) =$

(A) -1 (B) 0.5 (C) 0.25 (D) 1

20. Which of the following is true?

(A) $\sin 1 < \sin 1°$ (B) $\sin 2 < \sin 2°$ (C) $\sin 3 < \sin 3°$ (D) $\sin 4 < \sin 4°$

SPACE FOR ROUGH WORK

SECTION-2

This section contains Five (05) Numerical Value Type Questions. The answer to each question is an integer ranging from 0 to 99 (both inclusive).

1. The value of K, so that the sum and product of roots of $2x^2 + (K-3)x + 3K - 5 = 0$ are equal, is equal to :

2. The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is:

3. If $(1 + \tan 91°)(1 + \tan 92°)(1 + \tan 93°)...(1 + \tan 179°) = 2^{n-1} - 1,$ then value of n is:

4. If $\sin x + \sin^2 x = 1$, then the value of $\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x + 1$ is equal to :

5. If the value of $\cos 12° + \cos 84° + \cos 156° + \cos 132°$ is A then $2A + 5 = $ _____.

SPACE FOR ROUGH WORK

••• End of JEE Main – 2 [JEE - 2024] •••