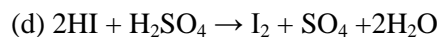
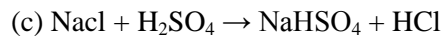
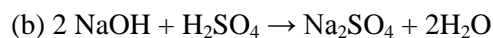


Q.5

Which of the following reaction depict the oxidizing behavior of H_2SO_4 ?

**Q.6**

Which of the following halides is not oxidized by MnO_2 ?

**Q.7**

The activation energy for a simple chemical reaction $\text{A} \rightarrow \text{B}$ is E_a in forward direction. The activation energy for the reverse reaction

(a) is negative of E_a

(b) is always less than E_a

(c) Can be less than or more than E_a

(d) is always double of E_a

Q.8

In the reaction, $\text{I}_2 + 2\text{S}_2\text{O}_3^{2-} \rightarrow 2\text{I}^- + \text{S}_4\text{O}_6^{2-}$ equivalent mass of iodine is

(a) equal to its molecular mass

(b) $\frac{1}{2}$ of the molecular mass

(c) $\frac{1}{4}$ of the molecular mass

(d) twice the molecular mass

Q.9

An aqueous solution contains the following ions:

Hg_2^{2+} , Hg^{2+} , Pb^{2+} and Cd^{2+} . The addition of dil. HCl (6N) precipitates

- (a) Hg_2Cl_2 only
- (b) Hg_2Cl_2 and PbCl_2
- (c) PbCl_2 only
- (d) PbCl_2 and Hg_2Cl_2

Q.10

Which one of the following oxides is ionic?

- (a) P_2O_5
- (b) CrO_3
- (c) MnO
- (d) Mn_2O_7

Q.11

The AsF_5 molecule is trigonalbipyramidal. The hybrid orbitals used by the As atoms for bonding are

- (a) $d_{x^2-y^2}$, d_{z^2} , s, p_x , p_y
- (b) d_{xy} , s, p_x , p_y , p_z
- (c) s, p_x , p_y , p_z , d_{z^2}
- (d) $d_{x^2-y^2}$, s, p_x , p_y

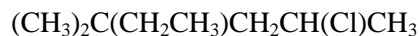
Q.12

The most stable conformation of n- butane is

- (a) Skew boat
- (b) eclipsed
- (c) gauche
- (d) staggered anti

Q.13

IUPAC nomenclature of the given organic compound will be



- (a) 5- Chloro-3, 3- dimethylhexane
- (b) 4-Chloro-2-ethyl-2-methylpentane
- (c) 2-Chloro-4-ethyl-4- methylpentane
- (d) 2-Chloro-4, 4-dimethylhexane

Q.14

Which of the following species is most stable?

- (a) $p - \text{O}_2\text{N} - \text{C}_6\text{H}_4 - ^+\text{CH}_2$
- (b) $\text{C}_6\text{H}_5 - ^+\text{CH}_2$
- (c) $p - \text{Cl} - \text{C}_6\text{H}_4 - ^+\text{CH}_2$
- (d) $p - \text{CH}_3\text{O} - \text{C}_6\text{H}_4 - ^+\text{CH}_2$

Q.15

Which of the following will be the main product, when benzene vapours are allowed to react with V_2O_5 at 723K.

- (a) $\text{CO}_2 + \text{H}_2$
- (b) diphenyl + H_2
- (c) maleic anhydride
- (d) maleic anhydride and diphenyls

Q.16

What is the decreasing order of reactivity amongst the following compounds towards aromatic electrophilic substitution?

(I) chlorobenzene

(II) benzene

(III) anilinium chloride

(IV) toluene

(a) II > I > III > IV

(b) III > I > II > IV

(c) IV > II > I > III

(d) I > II > III > IV

Q.17

Addition of HI on the double bond of propene yields isopropyl iodide and not n-propyl iodide as the major product. This is because the addition proceeds through

(a) a more stable carbocation

(b) a more stable carbanion

(c) a more stable free radical

(d) a less stable carbocation

Q.18

Which of the following sodium compounds is /are formed when an organic compound containing both nitrogen and sulphur is fused with sodium?

(a) cyanide and sulphide

(b) thiocyanate

(c) sulphite and cyanide

(d) nitrogen and sulphide

Q.19

Treatment of phenol with dilute nitric acid gives

- (a) o- nitrophenol
- (b) p- nitrophenol
- (c) a mixture of o- and p- nitrophenols
- (d) trinitrophenol

Q.20

The correct order of electron affinity of F, Cl, Br and I is

- (a) $F > Cl > Br > I$
- (b) $I > Br > Cl > F$
- (c) $Cl > F > Br > I$
- (d) $Br > Cl > F > I$

Q.21

Toluene reacts with chlorine in the presence of light to give

- (a) benzyl chloride
- (b) benzoyl chloride
- (c) p- chlorotoluene
- (d) o -chlorotoluene

Q.22

Lithium has a much higher ionisation energy than cesium but in aqueous solution Li is a more powerful reducing agent than cesium because

- (a) the outermost shell electron is more easily lost by Li
- (b) the outermost electron is more easily lost by Cs
- (c) the hydration energy of Li^+ is high
- (d) the hydration energy of Cs^+ is high

Q.23

In the solvay process, the reaction $2\text{NH}_4\text{Cl} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCl}_2 + 2\text{NH}_3 + 2\text{H}_2\text{O}$ takes place in

- (a) carbonation tower
- (b) saturation tank
- (c) ammonia recovery tower
- (d) filtration unit

Q.24

Which of the following are matched correctly?

- (a) Sodium benzoate – antacid
- (b) Aspirin – analgesic
- (c) Aluminum hydroxide – preservative
- (d) sulphadiazine – disinfectant

Q.25

A mixture of 1-bromo propane and 2-bromo propane on heating with alcoholic solution of sodium hydroxide gives

- (a) propane
- (b) n- propyl alcohol
- (c) iso- propyl alcohol
- (d) a mixture of n- and iso- propyl alcohols

Q.26

Which is the most suitable test for the detection of unsaturation in a given olefinic hydrocarbon?

- (a) Markownikov test
- (b) Grignard test
- (c) Baeyer's test
- (d) Ferric chloride (neutral) test

Q.27

Which statement is not true regarding NH_3 and PH_3 ?

- (a) PH_3 is a weaker base than NH_3
- (b) PH_3 is a weaker reducing agent than NH_3
- (c) PH_3 is less soluble in water than NH_3
- (d) PH_3 burns in oxygen to give P_2O_5 , whereas NH_3 burns in oxygen to give N_2

Q.28

With reference to alkali metals which one of the following statements is correct?

- (a) they are strong oxidising agents.
- (b) they are strong reducing agents
- (c) they are mild oxidizing agents
- (d) they are mild reducing agents

Q.29

Which of the following molecules has regular geometry?

- (a) H_2O
- (b) PF_3
- (c) XeF_4
- (d) SF_6

Q.30

If the solubility of Ag_2CrO_4 in water is C mole/litre, Its solubility product will be

- (a) C^2
- (b) C^3
- (c) $4C^2$
- (d) $4C^3$

PHYSICS

Q.1

If C and r denote capacity and resistance, then $C \times R$ is

- (a) length
- (b) frequency
- (c) time
- (d) mass

Q.2

A nut is screwed into a bolt with 12 turns per cm and diameter 1.18 cm. the bolt is lying in horizontal direction. The nut spins at 216 rpm. Time taken by the nut to cover 1.5 cm along the bolt is

- (a) 2s
- (b) 3s
- (c) 4s
- (d) 5s

Q.3

A spring balance is attached to the ceiling of a lift. A man hangs his bag on the spring which reads 49N, when the lift is stationary. If the lift moves downwards with an acceleration of 5 m/s^2 , the reading of the spring balance will be

- (a) 24 N
- (b) 74 N
- (c) 15 N
- (d) 49 N

Q.4.

A sphere collides in elastically with another sphere of identical mass. The two spheres move after collision. The angle between the directions of two sphere is

- (a) 45°
- (b) different from 90°
- (c) 90°
- (d) 0°

Q.5

Two particles of mass 1kg and 3kg move towards each other under mutual force of attraction. No other force acts on them. When the relative velocity of approach of the two particles is 2 m/s, their centre of mass has a velocity of 0.5m/s and when the relative velocity of approach becomes 3 m/s, the velocity of their centre of mass is 0.75 m/s. then

- (a) the above statement is correct
- (b) the above statement is false
- (c) the above statement may be correct or incorrect
- (d) velocity of centre of mass can change in the given case.

Q.6

A point mass M is at a distance S from an infinitely long and thin rod of density D . if G is the gravitational constant then gravitational force between the point mass and the rod is

- (a) $\sqrt{3T/6}$
- (b) $\sqrt{2T/8}$
- (c) $T/\sqrt{3}$
- (d) $\sqrt{2T/\sqrt{3}\pi}$

Q.7

A cube of side b floats in a liquid of density three times the density of cube. The length of cube outside the liquid is

- (a) $b/3$
- (b) $2b/3$
- (c) $2b/5$
- (d) $b/5$

Q.8

During the melting of ice at 273K and at atmospheric pressure

- (a) positive work is done by ice water system on the atmosphere
- (b) positive work is done on the ice water system by the atmosphere
- (c) the internal energy of the ice water system remains same
- (d) the internal energy of the ice water system decreases

Q.9

A given quantity of an ideal gas is at a pressure P and absolute temperature t . The isothermal bulk modulus of gas is

- (a) $2P/3$
- (b) P
- (c) $3p/2$
- (d) $2P$

Read the following paragraph:

Two tuning forks when sounded together produce 6 beats per second. The first fork has the frequency 3% higher than a standard one and the second has the frequency 2% less than the standard fork. Now answer the following questions

Q.10

The frequencies in (Hz) of the fork 1 is

- (a) 126.3
- (b) 162.3
- (c) 136.2
- (d) 123.6

Q.11

Frequency (in Hz) of second fork is

- (a) 116.7
- (b) 162.3
- (c) 137.2
- (d) 117.6

Q.12

Flux coming out from a unit positive charge placed in air is

- (a) ϵ_0^0
- (b) $1/\epsilon_0^0$
- (c) $(4\pi\epsilon_0^0)^{-1}$
- (d) $4\pi\epsilon_0^0$

Q.13

Three resistors of resistance R each are combined in various ways. Which of the following can not be obtained?

- (a) $3R$
- (b) $2R/4$
- (c) $R/3$
- (d) $2R/3$

Read the Statement 1 and Statement 2 carefully to mark the correct option out of the options given below

- 1) If both Statement 1 and Statement 2 are true and Statement 2 is the correct explanation of the Statement 1**
- 2) If both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1**
- 3) If Statement 1 is true but Statement 2 is false**
- 4) If Statement 1 is false but Statement 2 is true**

Q.14

Statement 1: Ferromagnetic materials are strongly attracted by a magnet and their permeability is much more than unity and susceptibility has large positive value

Statement 2: Paramagnetic materials are weakly repelled by a magnet, their permeability is less than 1 and susceptibility has a small negative value.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Q.15

A solenoid of length 0.4 m and having 500 turns of wires carries a current of 3 A. A thin coil having 10 turns of wire and of radius 0.01 m carries a current of 0.4 A. The torque required to hold the coil in the middle of the solenoid with its axis perpendicular to the axis of solenoid is

- (a) $6 \times 10^{-6} \text{ N}$
- (b) $5.94 \times 10^{-6} \text{ N}$
- (c) $9.54 \times 10^6 \text{ N}$
- (d) $5.9 \times 10^{-8} \text{ N}$

Q.16

When a magnet is moved with its north pole towards a coil placed in a closed circuit, then the nearest face of the coil is

- (a) shows south polarity
- (b) shows north polarity
- (c) shows no polarity
- (d) shows sometimes north and sometimes south polarity

Q.17

In a transformer having 100% efficiency, the input power is 60 watt. The number of primary coils is 100 and the number of secondary coils is 300. The output power is

- (a) 60
- (b) 120
- (c) 180
- (d) 240

Q.18

The amplitude of the sinusoidal oscillating electric field of a plane wave is 60V/m. The amplitude of magnetic field is

- (a) 2×10^7 T
- (b) 6×10^7 T
- (c) 6×10^{-7} T
- (d) 2×10^{-7} T

Q.19

In Young's double slit experiment the two slits are at a distance d apart. Interference pattern is observed on the screen at a distance D from the slits. At a point on the screen directly opposite, one of the slits, a dark fringe is observed. The wavelength of the wave is

- (a) d/D
- (b) D/d
- (c) D_2/D
- (d) D/D_2

Q.20

The objective of a telescope, after focusing for infinity is taken out and a slit of length L is placed in its position. A sharp image of the slit is formed by the eye piece at a certain distance from it on the other side. The length of the image is I . The magnification of the telescope is

- (a) $1/2L$
- (b) $2L/1$
- (c) $1/L$
- (d) $L/1$

Q.21

White light reflected at normal incidence from a soap film has maximum at 6000\AA and minimum at 4500\AA in the visible region with no minimum in between. If μ is 1.33 for film, the thickness of film is

- (a) $3.83 \times 10^{-3} \text{ cm}$
- (b) $8.33 \times 10^{-4} \text{ cm}$
- (c) $8.33 \times 10^{-5} \text{ cm}$
- (d) $3.38 \times 10^{-5} \text{ cm}$

Q.22

Assuming that de Broglie wave associated with an electron can form a standing wave between atoms arranged in one dimensional array with nodes on each of atomic site, it is found that one such wave is formed. The distance between the arrays of the atoms is 2\AA , A similar standing wave is again formed if d is increased to 2.5\AA , The least value of forming standing wave is

- (a) 0.5\AA
- (b) 0.4\AA
- (c) 0.6\AA
- (d) 0.3\AA

Read the Statement 1 and Statement 2 carefully to mark the correct option out of the options given below

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2) If both Statement 1 and Statement 2 are true hut Statement 2 is not the correct explanation of Statement 1

3) If Statement 1 is true hut Statement 2 is false 4)If Statement 1 is false hut Statement 2 is true

Q.23

Statement 1: Graphite and heavy water are the examples of a moderator

Statement 2: These are the substances which slow down the fast moving neutrons

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Q.24

Half life of a substance is 20 minutes. What is the time between 33% decay and 67% decay?

- (a) 40 min
- (b) 20 min
- (c) 30 min
- (d) 25 min

Q.25

When npn transistor is used as an amplifier

- (a) electron move from base to collector
- (b) hole move from collector to base
- (c) holes move from emitter to base
- (d) holes move from base to emitter

Q.26

A modulation signal is a square wave of 1V. The carrier wave is given by $C(t) = 2\sin(81\pi t)$ V. The modulation index will be

- (a) 1
- (b) 2
- (c) 0.5
- (d) 1.5

Q.27

A parallel plate capacitor of capacitance C is connected to a battery and is charged to a potential difference V . Another capacitor of capacitance $2C$ is similarly charged to a potential difference $2V$. The charging battery is now disconnected and the capacitors are connected in parallel to each other in such a way that the positive terminal of one is connected to the negative terminal of the other. The final energy of the configuration is

- (a) zero
- (b) $3CV^2/2$
- (c) $25CV^2/6$
- (d) $9CV^2/2$

Q.28

A battery is connected between two points a and b on the circumference of uniform conducting ring of radius r and resistance R . One of the arcs AB of the ring subtends an angle θ at the centre. The value of the magnetic induction at the centre due to the current in the ring is:

- (a) proportional to $(180^\circ - \theta)$
- (b) inversely proportional to r
- (c) zero, only if $\theta = 180^\circ$
- (d) zero for all values of θ

Q.29

The following four wires are made of same material. Which of these will have the largest extension when the same tension is applied?

- (a) Length = 50 cm, diameter = 0.5 mm
- (b) Length = 100, diameter = 1 mm
- (c) length = 200 cm, diameter = 2 mm
- (d) Length = 300 cm, diameter = 3 mm

Q.30

A gas mixture consists of 2 moles of oxygen and 4 moles of argon at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

- (a) 4RT (b) 15 RT
(c) 9RT (d) 11RT

MATHEMATICS**Q.1**

Two infinite sets have m and n elements. The total number of subsets of first set is 56 more than the total number of subsets of second test. Then the value of m and n are

- (a) (3, 6)
(b) (5, 4)
(c) (3, 7)
(d) (4, 5)

Q.2

The domain and range of real valued function $f(x) = \frac{4-x}{x-4}$ is

- (a) Domain (f) = R, Range (f) = R - {4}
(b) Domain (f) = R - {4}, Range (f) = R
(c) Domain (f) = R - {4}, Range (f) = {-1}
(d) Domain (f) = R - {4}, Range (f) = R - {4}

Q.3

If $\cos\theta + \sin\theta = \sqrt{2} \cos\theta$ then $\cos\theta - \sin\theta$ is equal to

- (a) $\sqrt{2} \cos\theta$
(b) $\sqrt{2} \sin\theta$
(c) $\sqrt{2}$
(d) 1

Q.4

If $\cot\alpha = \frac{1}{2}$, $\sec\beta = -\frac{5}{3}$, where $\pi < \alpha < \frac{3\pi}{2}$ and $\frac{\pi}{2}$

$< \beta < \pi$. Then the value of $\tan(\alpha + \beta)$ is

(a) $\frac{2}{11}$

(b) $\frac{3}{11}$

(c) $\frac{4}{9}$

(d) None of these

Q.5

$\sin^4 \frac{\pi}{8} + \sin^4 \frac{3\pi}{8} + \sin^4 \frac{5\pi}{8} + \sin^4 \frac{7\pi}{8}$ is equal to

(a) $\frac{1}{2}$

(b) 1

(c) $\frac{3}{2}$

(d) 2

Q.6

In any triangle ABC, $\frac{c-a \cos B}{b-a \cos C}$ is equal to

(a) $\frac{\cos B}{\cos C}$

(b) $\frac{\cos B}{\sin C}$

(c) $\frac{\sin B}{\cos C}$

(d) $\frac{\sin B}{\sin C}$

Q.7

$\left(\frac{3+2i}{2-3i}\right) + \left(\frac{3-2i}{2+3i}\right)$ is equal to

(a) 0

(b) 2

(c) 3

(d) 2i

Q.8

If x is real number then the solution of $5x-3 < 3x + 1$ is

- (a) 0
- (b) $(0, \infty)$
- (c) $(-\infty, 0)$
- (d) $(-\infty, 2)$

Q.9

Out of 5 men and 2 women, a committee of 3 is to be formed. If at least one woman is included then number of ways committee can be formed is

- (a) 20
- (b) 25
- (c) 27
- (d) 30

Q.10

The sum of all the odd integers between 2 and 100 divisible by 3 is

- (a) 821
- (b) 867
- (c) 893
- (d) 898

Q.11

Two vertices of a triangle are $(3, -5)$ and $(-7, 4)$. If the centroid $(2, -1)$ then the third vertex is

- (a) $(10, -2)$
- (b) $(9, -1)$
- (c) $(11, -2)$
- (d) $(10, -1)$

Q.12

The equation of the image of the circle $x^2 + y^2 + 8x - 16y + 64 = 0$ in the line mirror $x = 0$ is

(a) $x^2 + y^2 + 8x - 16y - 64 = 0$

(b) $x^2 + y^2 - 8x + 16y + 64 = 0$

(c) $x^2 + y^2 - 8x + 16y + 64 = 0$

(d) None of these

Q.13

The equation of the ellipse whose axes are along the coordinate axes, vertices are $(\pm 5, 0)$ and foci at $(\pm 4, 0)$ is

(a) $\frac{x^2}{25} + \frac{y^2}{9} = 1$

(b) $\frac{x^2}{25} + \frac{y^2}{16} = 1$

(c) $\frac{x^2}{16} + \frac{y^2}{25} = 1$

(d) None of these

Q.14 If $f(x) = \begin{cases} \frac{x-|x|}{2} & x \neq 0 \\ 2, & x = 0 \end{cases}$ then $\lim_{x \rightarrow 0} f(x)$ is equal to

(a) 0

(b) 2

(c) 1

(d) Does not exist

Q.15

Four persons are to be chosen at random from a group of 3 men, 2 women and 4 children. The probability of selecting exactly 2 children is

(a) $\frac{9}{20}$

(b) $\frac{10}{21}$

(c) $\frac{11}{27}$

(d) None of these

Q.16

$\sin^{-1}\left(\sin \frac{2\pi}{3}\right)$ is equal to

(a) $\frac{\pi}{3}$

(b) $\frac{2\pi}{3}$

(c) 0

(d) None of these

Q.17

$\begin{vmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & ab & a+b \end{vmatrix}$ is equal to

(a) 0

(b) abc

(c) $a^2b^2c^2$

(d) $A+b+c$

Q.18

If the function $f(x)$ is given by $f(x) \begin{cases} 3ax + b & \text{if } x > 1 \\ 11 & \text{if } x = 1 \\ 5ax - 2b & \text{if } x < 1 \end{cases}$ is continuous at $x = 1$. Then the value of a and b are

(a) $A = 3, b = 3$

(b) $A = 3, b = 4$

(c) $A = 2, b = 3$

(d) $A = 3, b = 2$

Q.19

If $f(x) = |x|$, the value of $f'(x)$ at $x = 0$ is

(a) 0

(b) 1

(c) $\frac{1}{2}$

(d) $F(x)$ is not differentiable

Q.20

If $y = \sqrt{\frac{1+e^x}{1-e^x}}$, then $\frac{dy}{dx}$ is equal to

- (a) $\frac{e^x}{(1-e^x)\sqrt{1-e^{2x}}}$
- (b) $\frac{e^x}{\sqrt{1-e^{2x}}}$
- (c) $\frac{e^x}{(1+e^x)\sqrt{1-e^{2x}}}$
- (d) $\frac{e^x}{(1+e^x)\sqrt{1-e^x}}$

Q.21

Product of slopes of tangents to the curve $y = x^2 - 5x + 6$ at the points (2, 0) and (3, 0) is

- (a) 1
- (b) 2
- (c) -1
- (d) None of these

Q.22

Solution of $4x^2 - 24x^2 + 44x - 24 > 0$ is

- (a) $x \in (1, 2) \cup (3, \infty)$
- (b) $x \in (2, 3)$
- (c) $x \in (1, \infty)$
- (d) $x \in (3, \infty)$

Q.23

The points of local maxima and minima of the function $f(x) = x^3 - 6x^2 + 9x - 8$ are

- (a) $x = 1$ is point of local maxima & $x = 3$ is point of local minima
- (b) $x = 3$ is point of local maxima & $x = 1$ is point of local minima
- (c) $x = 1$ is point of local maxima & $x = 2$ is point of local minima
- (d) $x = 3$ is point of local maxima & $x = 2$ is point of local minima

Q.24

$\int \frac{1+\cos 4x}{\cos x - \tan x} dx$ is equal to

(a) $\frac{1}{4}\cos x + c$

(b) $\frac{1}{8}\cos 4x + c$

(c) $-\frac{1}{8}\cos 4x + c$

(d) $-\frac{1}{8}\sin 4x + c$

Q.25

$\int \frac{a^x}{1-a^{2x}} dx$ is equal to

(a) $\frac{1}{\log a} \sin^{-1}(a^x) + c$

(b) $\frac{1}{\log a} \cos^{-1}(a^x) + c$

(c) $\sin^{-1}(a^x) + c$

(d) $\cos^{-1}(a^x) + c$

Q.26

Number of three digits number more than 600 which can be formed by using the digits 2, 3, 4, 6, 7 is

(a) 25

(b) 30

(c) 45

(d) 50

Q.27

The first term of a G.P. is 1. The sum of the third and fifth term is 90. Then the common ratio of G.P. is

(a) 1

(b) 2

(c) 3

(d) 4

Q.28

The equation of the line which cuts off an intercept 4 on the positive direction of x-axis and an intercept 3 on the negative direction of y-axis is

- (a) $3x+4y=12$
- (b) $3x-2y=6$
- (c) $3x+4y=6$
- (d) $3x-4y=12$

Q.29

The equation of the circle which passes through (1, 2) and (4, -3) and has its centre on the line $3x+4y=7$ is

- (a) $15(x^2+y^2)-94x+18y+55=0$
- (b) $15(x^2+y^2)-94x-18y-55=0$
- (c) $x^2+y^2-9x-18y-5=0$
- (d) None of these

Q.30

$\lim_{x \rightarrow \frac{\pi}{6}} \frac{2\sin^2 x + \sin x - 1}{2\sin^2 x - 3\sin x + 1}$ is equal to

- (a) -1
- (b) -2
- (c) -3
- (d) 0