

PRACTICE PAPER

CHEMISTRY

Q1.

Given that, for the reaction $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$, energy released is 57.1 kJ. Three reactions are given as follows

(1) 0.25 mole of HCl in solution is neutralized by 0.25 mole of NaOH; heat released is ΔH_1 .

(2) 0.5 mole of HNO_3 in solution is mixed with 0.2 mole of KOH solution; heat released is ΔH_2 .

(3) 200 cm^3 of 0.2 M HCl solution is mixed with 300 cm^3 of 0.1 M NaOH solution heat released is ΔH_3 .

The correct order for the numerical value of ΔH_1 , ΔH_2 , ΔH_3 would be

- (a) $\Delta H_1 > \Delta H_2 > \Delta H_3$
- (b) $\Delta H_1 > \Delta H_3 > \Delta H_2$
- (c) $\Delta H_3 > \Delta H_2 > \Delta H_1$
- (d) $\Delta H_2 > \Delta H_1 > \Delta H_3$

Q2.

Given the following standard electrode potentials :

Element	Electrode reaction
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$E^\circ_{(298)}$	(Volts)
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$\text{Zn}/\text{Zn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Zn}(\text{s}) - 0.76$

$\text{Sn}/\text{Sn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}(\text{s}) - 0.14$

$\text{Pb}/\text{Pb}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Pb}(\text{s}) - 0.13$

$\text{Cu}/\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}(\text{s}) + 0.34$

Based on the above data, identify the correct answer. From an aqueous solution of the salts

- (a) Zinc can displace tin, lead, copper
- (b) Tin can displace zinc, lead, copper
- (c) Copper can displace zinc, tin, lead
- (d) Lead can displace zinc, tin, copper

Q3.

The electron energy for the quantum number $n = 2$ in a hydrogen atom is

- (a) $- 1.312 \times 10^6 \text{ Jmol}^{-1}$
- (b) $- 3.28 \times 10^5 \text{ Jmol}^{-1}$
- (c) $+ 3.28 \times 10^5 \text{ Jmol}^{-1}$
- (d) $+ 1.312 \times 10^6 \text{ Jmol}^{-1}$

Given, $m = 9.1 \times 10^{-31} \text{ kg}$; $e = 1.6 \times 10^{-19} \text{ C}$; $h = 6.6 \times 10^{-34} \text{ kgm}^2 \text{ s}^{-1}$

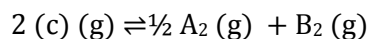
Q4.

The percent void space in close fcc packing of sphere is

- (a) 31.98 %
- (b) 25.96 %
- (c) 47.64 %
- (d) 74.04 %

Q5.

If the value for equilibrium constant for the reaction, $A_2 (g) + 2 B_2 (g) \rightleftharpoons 4 C (g)$ is 2. What is the equilibrium constant for the reaction:



- (a) 2
- (b) 4
- (c) $\sqrt{2}$
- (d) $\frac{1}{\sqrt{2}}$

Q6.

Solution with reversed acidity and alkalinity are known as

- (a) Isotonic solutions
- (b) Iso-hydric solutions
- (c) Buffer solutions
- (d) None of these

Q7.

The rate of a second order reaction is $5 \times 10^{-5} \text{ mol L}^{-1} \text{ S}^{-1}$. When the initial concentration of the reactant is 0.25 mol L^{-1} , the value of the rate is

- (a) $8 \times 10^{-4} \text{ Lmol}^{-1}$
- (b) $2 \times 10^{-4} \text{ mol}^{-1}$
- (c) $8 \times 10^{-4} \text{ molL}^{-1}$
- (d) $2 \times 10^{-4} \text{ Lmol}^{-1}$

Q8.

The reverse of chemiluminescence is called

- (a) Fluorescence
- (b) Photochemical reaction
- (c) Phosphorescence
- (d) Photosensitization

Q9.

Which of the following molecules has unpaired electron in antibonding molecular orbital?

- (a) O_2
- (b) F_2
- (c) N_2
- (d) C_2

Q10.

The pH of a buffer solution containing 0.1 M acetic acid and 0.1 M sodium acetate (pK_a of acetic acid is 4.74) is

- (a) 4.74
- (b) 5.74
- (c) 3.74
- (d) 9.48

Q11.

What is the hybridization of orbitals of boron and nitrogen, respectively, in $\text{BF}_3 \cdot \text{NH}_3$?

- (a) Sp^2, sp^3
- (b) $\text{Dsp}^2, \text{sp}^3$
- (c) Sp^2, sp^2
- (d) $\text{Sp}^2\text{d}, \text{sp}^2$

Q12.

Which of the following compounds is used testing iron in its trivalent state to give intense blue colour for its confirmation?

- (a) KSCN
- (b) $K_3 Fe (CN)_6$
- (c) $K_4 Fe (CN)_6$
- (d) $NH_4 NCS$

Q13.

The slag formed in blast furnace in metallurgy of iron is due to a reaction between:

- (a) Calcium & SiO_2
- (b) Calcium carbonate & Fe_2O_3
- (c) Calcium oxide & SiO_2
- (d) Calcium chloride & Fe_2O_3

Q14.

Which of the following compounds contains coordinate covalent bond?

- (a) $N_2H_5^+$
- (b) HCl
- (c) $BaCl_2$
- (d) H_2O

Q15.

Which of the following compound does contain peroxide bridge?

- (a) Na_2O_2
- (b) BaO_2
- (c) H_2O_2
- (d) SrO_2

Q16.

Amongst the inert gases most abundant gas in the atmosphere is

- (a) He
- (b) Kr
- (c) Ne
- (d) Ar

Q17.

The Green House effect in the atmosphere is exhibited due to the presence of following as in atmosphere.

- (a) CO_2
- (b) O_3
- (c) CO
- (d) all of these

Q18.

Which of the following has highest lattice energy?

- (a) $\text{Be}(\text{OH})_2$
- (b) $\text{Ca}(\text{OH})_2$
- (c) $\text{Na}(\text{OH})_2$
- (d) $\text{Ba}(\text{OH})_2$

Q19.

An atom or ion in an octahedral hole of a close packed structure has how many nearest neighbours?

- (a) 4
- (b) 8
- (c) 6
- (d) 12

Q20.

Out of the following values, which value is not correct for 20 volume solution of H_2O_2 ?

- (a) It contains 60.7 gm/ltr of H_2O_2
- (b) It is 6.07 % weight / volume
- (c) It is 1.8 molar solution of H_2O_2
- (d) It liberates 40 litres of oxygen on decomposition.

Q21.

Besides Ba_2O , CaO and SiO_2 , pyrex glass contains two more oxides. Which of the following are correct?

- (a) Fe_2O_3 , Al_2O_3
- (b) PbO , ZnO
- (c) TiO_2 , B_2O_3
- (d) B_2O_3 , Al_2O_3

Q22.

Which of the following reactions is not correct?

- (a) SO_3 (in the presence of H_2O) \rightarrow H_2SO_4
- (b) P_2O_5 (in the presence of H_2O) \rightarrow HPO_3
- (c) N_2O (in the presence of H_2O) \rightarrow HNO_2
- (d) B_2O_3 (in the presence of H_2O) \rightarrow HBO_2

Q23.

Which of the following compounds is formed when 'hypo' dissolves silver bromide?

- (a) $\text{Na}_3 [\text{Ag}(\text{S}_2\text{O}_3)_2]$
- (b) $\text{Na}_2 [\text{Ag}(\text{SO}_3 \text{ Br})]$
- (c) $\text{Na} [\text{Ag} (\text{SO}_3)_3]$
- (d) $\text{Na} [\text{Ag} (\text{S}_2 \text{O}_3)_2]$

Q24.

Which of the following is the allotrope of carbon ?

- (a) Fullerene
- (b) Freon
- (c) Ferrocene
- (d) Furazine

Q25.

The diamagnetic species is

- (a) $[\text{Ni} (\text{CN})_4]^{2-}$
- (b) $[\text{NiCl}_4]^{2-}$
- (c) $[\text{CoCl}_4]^{2-}$
- (d) $[\text{CoF}_6]^{2-}$

Q26.

The product in the following reaction is:

- (a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- (b) $(\text{CH}_3)_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
- (c) $(\text{CH}_3)_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
- (d) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

Q27.

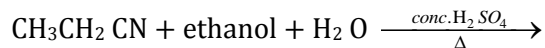
Nitration of aniline in strongly acidic medium, results in the formation of m- nitroaniline also

This is because

- (a) Amino group is meta orienting during electrophilic substitution reaction
- (b) Nitro group goes always to the meta position irrespective of the substituents
- (c) Nitration of aniline is a nucleophilic substitution reaction in strongly acidic medium
- (d) In strongly acidic conditions aniline is present as anilinium ion.

Q28.

State the product available by the following reaction.



- (a) Ethyl formate + NH_3
- (b) Ethyl propanoate + NH_3
- (c) Ethyl butanoate + NH_3
- (d) Ethyl acetate + NH_3

Q29.

An organic compound contains 49.3 % carbon 6.84 % hydrogen and its vapour density is 73. Molecular formula of the compound is

- (a) $\text{C}_3\text{H}_8\text{O}_2$
- (b) $\text{C}_3\text{H}_{10}\text{O}_2$
- (c) $\text{C}_6\text{H}_{10}\text{O}_4$
- (d) $\text{C}_4\text{H}_{10}\text{O}_2$

Q30.

Which is the most thermodynamically stable allotropic form of phosphorus?

- (a) Red
- (b) Black
- (c) White
- (d) Yellow

PHYSICS

Q1.

A quantity $X = \epsilon_0 L \frac{\Delta V}{\Delta t}$ where ϵ_0 is absolute permittivity, L is length, ΔV is change in potential difference and Δt is change in time, Dimensions of X are same as that of

- (a) Resistance
- (b) Charge
- (c) Voltage
- (d) Current

Q2.

A player throws a ball upwards with an initial speed of 294 ms^{-1} . The height to which the ball rises and the time taken to reach the player's hands are assessed in different manners. The correct choice is

- (a) The height is 34.4 m
- (b) The time is 6s
- (c) The time is 3s
- (d) The height is 44 m

Q3.

A man fires a bullet of mass 200g at a speed of 5ms^{-1} with a gun of 1kg mass. By what velocity the gun rebounds back?

- (a) 0.1 ms^{-1}
- (b) 10ms^{-1}
- (c) 1ms^{-1}
- (d) 0.01ms^{-1}

Q4.

The moment of inertia of a square plate about a diagonal is I_d and that about a median is I_m , then

- (a) $I_m = I_d$
- (b) $I_m < I_d$
- (c) $I_m > I_d$
- (d) None of these

Following question consists of two statements printed as Statement 1 and Statement 2. While answering these questions you are required to select any one of the response indicated as

1. if both statement 1 and Statement 2 are true and Statement 2 is a correct explanation of Statement 1.
2. If both Statement 1 and Statement 2 are true but the Statement 2 is not a correct explanation of Statement 1.
3. If Statement 1 is true but the Statement 2 is false.
4. If Statement 1 is false but Statement 2 is true.

Q5.

Statement 1 : Engine always works to keep a car moving
Statement 2 : Engine always works to keep a car moving

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

Q6.

A quantity $X = \epsilon_0 L \frac{\Delta V}{\Delta t}$ where ϵ_0 is absolute permittivity, L is length, ΔV is change in potential difference and Δt is change in time. Dimensions of X are same as that of

- (a) Resistance
- (b) Charge
- (c) Voltage
- (d) Current

Q7.

A player throws a ball upwards with an initial speed of 29.4 ms^{-1} . The height to which the ball rises and the time taken to reach the player's hands are assessed in different manners. The correct choice is

- (a) The height is 34.4 m
- (b) The time is 6s
- (c) The time is 3s
- (d) The height is 44 m

Q8.

Three rods of equal length / are joined to form an equilateral triangle PQR. O is the mid point is PQ. Distance OR remains same for small change in temperature. Coefficient of linear expansion, α_1 for PR and α_2 for RQ are same. Then

- (a) $\alpha_2 = 3 \alpha_1$
- (b) $\alpha_2 = 4\alpha_1$
- (c) $\alpha_1 = 3\alpha_2$
- (d) $\alpha_1 = 4\alpha_2$

Q9.

If v is the mean speed, v_{rms} is the root mean square speed and V_p is the most probable speed of an ideal monoatomic gas at absolute temperature and mass of a gas molecule is m , then average kinetic energy of a molecule is

- (a) $\frac{1}{2} mv^2$
- (b) $\frac{3}{4} mv^2$
- (c) $\frac{3}{4} mv_{\text{rms}}^2$
- (d) $\frac{3}{4} mv_p^2$

Q10.

A simple pendulum with length l and bob mass m is executing SHM of small amplitude A . The maximum tension in the string will be

- (a) $mg (1 + A/l)$
- (b) $mg (1 + a/l)^2$
- (c) $mg [1 + (A / l)^2]$
- (d) mg

Q11.

The bob of a simple pendulum of length l is released at time $t = 0$ from the position of small angular displacement θ . Linear displacement of the bob at any time t is given as

- (a) $l\theta \cos(gt/l)^{1/2}$
- (b) $l\cos (gt / l)^{1/2}$
- (c) $l\sin \theta$
- (d) $l \theta \sin (gt/l)^{1/2}$

Q12.

1000 drops of water of radius 1 cm each carrying a charge of 10 esu combine to form a single drop. The capacitance of combined drop increases

- (a) 1 time
- (b) 10 times
- (c) 100 times
- (d) 1000 times

Q13.

The length of given cylindrical wire is increased by 100%. Due to consequent decrease in diameter the change in the resistance of the wire will be

- (a) 300 %
- (b) 200 %
- (c) 100 %
- (d) 50 %

Read the following paragraph

A thin magnetic needle has a time period of vibration as 6s in earth's magnetic field. It suddenly breaks into two pieces of half lengths. Let T be the time period of unbroken needle and T' be the time period of the broken piece.

Now answer the following questions:

Q14.

Ratio of moment of inertia of broken needle to normal is

- (a) 1 : 1
- (b) 1 : 2
- (c) 1 : 4
- (d) 1 : 8

Q15.

Ratio of magnetic moment of broken needle to normal needle is

- (a) 1 : 1
- (b) 1 : 2
- (c) 1 : 4
- (d) 1 : 8

Q16.

An inductor resistance battery circuit is switched on at $t = 0$. If the emf of battery is E , the charge passing through the battery in time constant T is

- (a) ET / Re
- (b) eET / R
- (c) $ET / R\pi e$
- (d) $2ET / eR$

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Q17.

Statement 1 : Energy currents of mechanical type have an aluminium disc.

Statement 2 : Eddy currents or Foucault's currents are produced in the metallic disc when it is rotated in the magnetic field to move the counters of the metre.

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

Q18.

An electromagnetic radiation has an energy 14.4 eV. To which region of electromagnetic spectrum does it belong?

- (a) Ultraviolet region
- (b) Visible region
- (c) X-ray region
- (d) γ - region

Q19.

To increase both the resolving power and magnifying power of a telescope

- (a) Both the focal length and aperture of the objective has to be increased.
- (b) The focal length of the objective has to be increased.
- (c) The aperture of the objective has to be increased.
- (d) The wavelength of light has to be decreased.

Q20.

H Polaroid is prepared by

- (a) Orienting herapathite crystals in the same direction
- (b) Using thin tourmaline crystals
- (c) Stretching polyvinyl alcohol and then heating with dehydrating agent
- (d) Stretching polyvinyl alcohol and then impregnating with iodine

Q21.

An ideal mirror has an area a . light energy of frequency ν and velocity c falling on this mirror per unit area is E for n photons in unit time. Then

- (a) No force is exerted on the mirror
- (b) A non calculable force exerts on the mirror
- (c) Force acted is given by $2nh\nu/c$
- (d) No force but some pressure is exerted on the mirror.

Q22.

If the refractive index of a material of equilateral prism is $\sqrt{3}$, the angle of minimum deviation of the prism is

- (a) 30°
- (b) 45°
- (c) 60°
- (d) 75°

Q23.

A proton and an α particle have kinetic energy in the ratio $16 : 1$. The ratio of de Broglie waves associated with them is

- (a) $100 \lambda_s$
- (b) $200 \lambda_s$
- (c) $300 \lambda_s$
- (d) $400 \lambda_s$

Q25.

When a transistor is used in a circuit

- (a) The emitter base junction is forward biased and base collector junction is reverse biased
- (b) The emitter base junction is reverse biased and the base collector junction is forward biased
- (c) Both junctions are reverse biased.
- (d) None of these

Q26.

How many geo synchronous satellites are required to provide the communication over the whole part of the earth?

- (a) Minimum three
- (b) Minimum one
- (c) Minimum three
- (d) Minimum four

Q27.

An ionized gas contains both positive and negative ions. If it is subjected simultaneously to an electric field along the positive x direction and a magnetic field along the positive z direction, then

- (a) Positive ions deflect towards positive y direction and negative ion towards negative y direction
- (b) All ions deflect towards positive y direction
- (c) All ions deflect towards positive y direction
- (d) Positive ions deflect towards negative y direction and negative ions towards negative y direction

Q28.

A satellite is moving with a constant speed v in a circular orbit about the earth. An object of mass m is ejected from the satellite such that it just escapes from the gravitational pull of the earth. At the time of its ejection, the kinetic energy of the object is

- (a) $\frac{1}{2}mv^2$
- (b) mv^2
- (c) $\frac{3}{2}mv^2$
- (d) $2mv^2$

Q29.

An idea spring with spring constant k is hung from the ceiling and a block of mass M is attached to its lower end. The mass is released with the spring initially unstretched. The maximum extension in the spring is

- (a) $\frac{4Mg}{k}$
- (b) $\frac{2Mg}{k}$
- (c) $\frac{Mg}{k}$
- (d) $\frac{Mg}{k}$

Q30.

Two blocks of masses 10 kg and 4 kg are connected by a spring of negligible mass and placed on a frictionless horizontal surface. An impulse gives a velocity of 14 m/s to the heavier block in the direction of the lighter block. The velocity of the centre of mass is

- (a) 30 m/s
- (b) 20 m/s
- (c) 10 m/s
- (d) 5 m/s
- (e)

MATHEMATICS

Q1.

In a survey of political preference, asked to give their preference on three government proposals I, II and III, 78% were in favor of at least on the proposals, 50% favored proposal I, 30% favored proposal II, 20% favored proposal III. If 5% favored all the three proposals, what % favored more than one of the three proposals?

- (a) 2
- (b) 11
- (c) 13
- (d) 17

Q2.

The range of the function $f(x) = [\sin x]$ is

- (a) $\{-1, 1\}$
- (b) $[-1, 1]$
- (c) $\{-1, 0, 1\}$
- (d) $[0, 1]$

Q3.

The locus of a point z satisfying $|2z - 1| = |z - 2|$ is a/an

- (a) Straight line
- (b) Circle
- (c) Ellipse
- (d) None of these

Q4.

The only root of $ax^3 + bx + c = 0$, $a \neq 0$, is zero, if

- (a) $c = 0$
- (b) $c = 0, b \neq 0$
- (c) $b = 0, c = 0$
- (d) $b = 0, c \neq 0$

Q5.

If $\alpha + \beta = 4$ and $\alpha^3 + \beta^3 = 44$, α, β are the roots of

- (a) $2x^2 - 7x + 16 = 0$
- (b) $3x^2 + 9x + 11 = 0$
- (c) $9x^2 - 27x + 20 = 0$
- (d) None of these

Q6.

Let $\Delta = \begin{vmatrix} a & a+b & a+b+c \\ 3a & 4a+3b & 5a+4b+3c \\ 6a & 9a+6b & 11a+9b+6c \end{vmatrix}$, where

$a = i, b = w, c = w^2$, then Δ is equal to

- (a) -1
- (b) 1
- (c) -i
- (d) i

Q7.

The number of ways of painting the faces of a cube with six different colour is

- (a) 2!
- (b) 3!
- (c) 6!
- (d) None of these

Q8.

$${}^nC_0 - \frac{1}{2}{}^nC_1 + \frac{1}{3}{}^nC_2 + \dots + (-1)^n C_n / n + 1 =$$

- (a) n
- (b) $1/n$
- (c) $\frac{1}{n+1}$
- (d) $\frac{1}{n-1}$

Q9.

The sum of first two terms of an infinite G.P. is 1 and every term is twice the sum of the successive terms. Its first term is

- (a) $\frac{1}{2}$
- (b) $\frac{1}{3}$
- (c) $\frac{2}{3}$
- (d) $\frac{3}{4}$

Q10.

$$\frac{3+5+7+\dots+n \text{ terms}}{5+8+11+\dots+10 \text{ terms}} = 7, \text{ then the value of } n \text{ is}$$

- (a) 19
- (b) 22
- (c) 33
- (d) 35

Q11.

If the sum of an infinite G.P. is 3 and the sum of the square of its terms is also 3, then its first term and common ratio are

- (a) $\frac{1}{2}, \frac{1}{3}$
- (b) $\frac{3}{2}, \frac{1}{2}$
- (c) $\frac{1}{3}, \frac{1}{4}$
- (d) None of these

Q12.

$$\text{Lt}_{x \rightarrow \infty} \left(\frac{x+5}{x+1} \right)^{x+4} \text{ is equal to}$$

- (a) e
- (b) e^2
- (c) e^3
- (d) e^4

Q13.

Lt $x \rightarrow 0 \frac{1-\cos x}{x}$ is equal to

- (a) 0
- (b) $\frac{1}{2}$
- (c) 1
- (d) does not exists

Q14.

Let $f(x) = x^{3/2}$, then $f'(0) =$

- (a) 0
- (b) $\frac{1}{2}$
- (c) 1
- (d) Does not exists

Q15.

If $y = 4x - 5$ is tangent to the curve $y^2 = px^3 + q$ at $(2, 3)$, then

- (a) $p = 2, q = 3$
- (b) $p = 2, q = -7$
- (c) $p = 3, q = 7$
- (d) $p = 2, q = -3$

Q16.

$$\int \sqrt{1 + \cos(x/4)} dx =$$

- (a) $8\sqrt{2} \sin(x/8) + c$
- (b) $-8\sqrt{2} \cos(x/8) + c$
- (c) $8\sqrt{2} \sin\left(\frac{x}{4}\right) + c$
- (d) None of these

Q17.

$$\int \log x dx =$$

- (a) $x(1 - \log x) + c$
- (b) $x(\log x - 1) + c$
- (c) $(1 + x) \log x + c$
- (d) $(1 - x) \log x + c$

Q18.

$$\int_0^{\pi} \sqrt{1 - \cos x} \, dx =$$

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

Q19.

The order of a differential equation whose solution is $y = \alpha \cos x + b \sin x$, where α and b are arbitrary constants, is

- (a) 1
- (b) 2
- (c) 3
- (d) Cannot be determined

Q20.

If $\frac{dy}{dx} + \frac{1}{y\sqrt{1-x^2}} = 0$, then which of the following statements is true?

- (a) $y^2 + 2\sin^{-1}x = c$
- (b) $x^2 + 2\sin^{-1}y = c$
- (c) $x^2 + 2\sin^{-1}x = c$
- (d) None of these

Q21.

The vertices of Δ are $(0, 0)$, $(3, 0)$ and $(0, 4)$. Its orthocenter is at

- (a) $(0, 0)$
- (b) $(1/2, 1/2)$
- (c) $(1/2, 3/2)$
- (d) $(1, 3/2)$

Q22.

The equation $\frac{x^2}{a^2} + \frac{x^2}{b^2} = 1$ represents a vertical ellipse if

- (a) $a^2 = b^2$
- (b) $a^2 > b^2$
- (c) $a^2 < b^2$
- (d) None of these

Q23.

The points $(5, -4, 2)$, $(4, -3, 1)$, $(7, -6, 4)$, $(8, -7, 5)$ are the vertices of

- (a) Parallelogram
- (b) Square
- (c) Rectangle
- (d) Rhombus

Q24.

A particle acted on the constant forces $4\hat{i} + \hat{j} - 3\hat{k}$ and $3\hat{i} + \hat{j} - 3\hat{k}$ to the point $5\hat{i} + 4\hat{j} + \hat{k}$. the total work done by the forces is

- (a) 10 units
- (b) 20 units
- (c) 30 units
- (d) 0 units

Q25.

The probability that a man will live 10 more years is $\frac{1}{4}$ and the probability that his wife will live 10 more years is $\frac{1}{3}$. then the probability that neither of them will be alive in 10 years is

- (a) $\frac{11}{12}$
- (b) $\frac{1}{2}$
- (c) $\frac{7}{12}$
- (d) None of these

Q26.

Period of $\cot 3x - \cos(4x + 3)$ is

- (a) $\pi/3$
- (b) $\pi/4$
- (c) π
- (d) $\pi/2$

Q27.

- (a) $\sin^{-1}\frac{65}{56}$
- (b) $\sin^{-1}\frac{56}{65}$
- (c) $\cos^{-1}\frac{13}{25}$
- (d) None of these

Q28.

The area of the figure bounded by curves $y^2 = 2x + 1$ and $x - y = 1$ is

- (a) $16/3$
- (b) $18/3$
- (c) $21/2$
- (d) None of these

Q29.

$\log(1 - x) = -\left(x + \frac{x^2}{2} + \frac{x^3}{3} + \dots\right)$ is valid for

- (a) all $x \in \mathbb{R}$
- (b) $-1 < x < 1$
- (c) $-1 < x \leq 1$
- (d) $-1 \leq x \leq 1$

Q30.

$1 + \log_e z + \frac{(\log_e z)^2}{2!} + \frac{(\log_e z)^3}{3!} + \dots$ is equal to

- (a) z
- (b) z^{-1}
- (c) $\log z$
- (d) None of these