REVIEW TEST - 1
CLASS – XII

Date :- 23– 05 - 2010 **Duration : 3 Hours** **Max. Marks : 222**

PAPER – 1

INSTRUCTIONS

Each of the three parts of the paper contains Section A only. Section A of each part contains 20 questions and total number of pages are **20**. Please ensure that the Questions paper you have received contains ALL THE QUESTIONS in each part and each section and PAGES.

SECTION - A

1. Question **1** to Quesion **12** has four choices (A), (B), (C), (D) out of which **only one is correct** & carry **4 marks** each. **1** mark will be deducted for each wrong answer.

2. Question **13** to Question **14** are Reasoning type question, contains Statement-1 (Assertion) & Statement-2 (Reason) Each Question has 5 choices (A), (B), (C), (D), (E) out of which **only one is correct** & carry **4 marks** each, 1 mark will be deducted for each wrong answer.

3. Question **15** to Question **20** are based upon **paragraph**. Question **15** to Question **20** has 4 choices (A), (B), (C), (D) out of which only **one is correct** & carry **3 marks** each. **1** mark will be deducted for each wrong answer.

NOTE : GENERAL INSTRUCTION FOR FILLING THE OMR ARE GIVEN BELOW.

1. Use only **HB pencil** or **blue/black pen (avoid gel pen)** for darkening the bubble.

2. Indicate the correct answer for each question by filling appropriate bubble in your OMR answer sheet.

3. The Answer sheet will be checked through computer hence, the answer of the question must be marked by shading the circles against the question by dark **HB pencil or blue/black pen**.

4. While filling the bubbles please be careful about SECTIONS [i.e. Section-A include single correct answers, reasoning type, paragraph type), Section-B (include match the column), Section-C (include subjective answers)].

SECTION-A	SECTION-B	SECTION-C
For example if only 'A' choice is correct then, the correct method for filling the bubble is A B C D E ● ○ ○ ○ ○ For example if only 'A & C' choices are correct then, the correct method for filling the bubble is A B C D E ● ○ ● ○ ○ the wrong method for filling the bubble are ⊘ ⊗ ◉ ◉ ◉ The answer of the questions in wrong or any other manner will be treated as wrong.	For example If Correct match for (A) is P; for (B) is R, S; for (C) is Q, T; for (D) is P, Q, S then the correct method for filling the bubble is P Q R S T A ● ○ ○ ○ ○ B ○ ○ ● ● ○ C ○ ● ○ ○ ● D ● ● ○ ● ○	**Ensure that all columns are filled**. Answers, having blank column will be treated as incorrect. Insert leading zero(s) if required : '6' should be filled as 0006 '86' should be filled as 0086 '1857' should be filled as 1857

PART - I [MATHEMATICS]

SECTION - (A)

[STRAIGHT OBJECTIVE TYPE]

Q.1 to ***12*** has four choices (A), (B), (C), (D) out of which ***ONLY ONE*** is correct

1. Suppose that the domain of the function $f(x)$ is set D and the range is the set R, where D and R are the subsets of real numbers. Consider the functions: $f(2x), f(x+2), 2f(x), f\left(\frac{x}{2}\right), \frac{f(x)}{2} - 2$. If m is the number of functions listed above that must have the same domain as f and n is the number of functions that must have the same range as f (x), then the ordered pair (m, n) is

(A) (1, 5) (B) (2, 3) (C) (3, 2) (D) (3, 3)

2. $f(x) = ax^2 + bx + c$, $g(x) = ax^2 + px + q$ $(b \neq p)$ and discriminant of $f(x) = 0$ & $g(x) = 0$ are equal. If $x = \alpha$ is a root of equation $f(x) = g(x)$, then

(A) α is the A.M. of roots of $f(x) = 0$ and $g(x) = 0$ (B) α is the A.M. of roots of $f(x) = 0$

(C) α is the A.M. of roots of $g(x) = 0$ (D) none of these

3. Assume that $\lim_{\theta \to -1} f(\theta)$ exists and $\frac{\theta^2 + \theta - 2}{\theta + 3} \leq \frac{f(\theta)}{\theta^3} \leq \frac{\theta^2 + 2\theta - 1}{\theta + 3}$ holds for certain interval containing the point $\theta = -1$ then $\lim_{\theta \to -1} f(\theta)$

(A) is equal to f (–1) (B) is equal to 1 (C) is non existent (D) is equal to – 1

(SPACE FOR ROUGH WORK)

4. What is the value of 'a' for which the equations $x^3 + ax + 1 = 0$ & $x^4 + ax^2 + 1 = 0$ have a common root
(A) 2 (B) –2 (C) 1 (D) –1

5. If $f(x) = \begin{cases} x - [x] & ; \text{ if } [x] \text{ is even} \\ 1 - x + [x] & ; \text{ if } [x] \text{ is odd} \end{cases}$ then area bounded by the curve & x-axis for $x \in [-10, 10]$ is

(where [*] denotes greatest integer function)
(A) 5 (B) 10 (C) 20 (D) 30

6. The value of $\sin^{-1}\left\{\cot\left[\sin^{-1}\sqrt{\frac{2-\sqrt{3}}{4}} + \cos^{-1}\frac{\sqrt{12}}{4} + \sec^{-1}\sqrt{2}\right]\right\}$ is equal to

(A) 0 (B) $\pi/12$ (C) $\pi/6$ (D) $\pi/4$

7. If domain of f(x) is (0, 1] then domain of $f(e^x) + f(\ell n\,|x|)$ is
(A) (1/e, 1) (B) $(0, e^{[\ell n\, k]})$, $k \in N$ (C) [–e, –1) (D) $(e^2, e^2 + 2)$

8. For the function $y = 1 + 3\,(\ell n \sin x + \ell n \operatorname{cosec} x)$ period is
(A) 2π (B) π (C) $\pi/2$ (D) none

(SPACE FOR ROUGH WORK)

9. Let k be a positive real number and $k = \sin^{-1}\left(\frac{1+t^2}{2t}\right)$ then number of integral values of α for which the equation $(x - [k])(x + \alpha) = 1$ has integral roots. (where [x] denotes the integral part of x)

(A) 1 (B) 2 (C) 4 (D) None of these

10. A linear function f whose composition fofofofofof(x) (where f applied six times) is equal to 2x – 1 for all x is

(A) $2^{\frac{1}{6}}x - 2^{\frac{1}{6}}$ (B) $2^{\frac{1}{5}}x - 2^{\frac{1}{6}}$ (C) $2^{\frac{1}{6}}x - 2^{\frac{1}{6}} + 1$ (D) None of these

11. $f : N \to N$ always satisfies $f(m)\, f(n) = f(m) + 3\, f(n)\ \forall\ m, n \in N\ (m \neq n)$ then $\underbrace{f(f(f(.....f(2))))}_{10\text{ times}}$ is equal to

(A) 1 (B) 4 (C) 10 (D) 4^{10}

12. The range of $f(x) = [\sin x + [\cos x + [\tan x + [\sec x]]]]$, $x \in (0, \pi/4)$ is (where [.] denotes the greatest integer function $\leq x$)

(A) {0, 1} (B) {–1, 0, 1} (C) {1} (D) None of these

(SPACE FOR ROUGH WORK)

[REASONING TYPE]

Q.13 to 14 is Reasoning type question, contains Statement-1 (Assertion) and Statement-2 (Reason) Each questions has **five** choices (A), (B), (C), (D), (E) out of which ***only one*** is correct

13. **Statement–1 :** Integral values of 'k' satisfying the inequality

$$(k-3)x^2 - 2(2k^2 - 7k + 3)x + (k-3) \le 0 \ \forall \ x \in R \text{ are } \{0, 1\}$$

Because

Statement–2 : Consider $y = ax^2 + bx + c$ is a quadratic polynomial, then

$$a < 0 \ \& \ D = 0 \Leftrightarrow y \le 0 \ \forall \ x \in R$$

(A) Statement (1) is true, statement (2) is true and statement (2) is correct explanation for Statement (1)
(B) Statement (1) is true, statement (2) is true and statement (2) is NOT the correct explanation for Statement (1)
(C) Statement (1) is true but statement (2) is false
(D) Statement (1) is false but statement (2) is true
(E) Statement (1) is false and statement (2) is false

14. **Statement–1 :** $\lim\limits_{x \to 0} \text{sgn}\left(\tan^{-1} x + \tan^{-1}\frac{1}{x}\right)$ does not exist.

Because

Statement–2 : $\lim\limits_{x \to 0} \text{sgn}\left(\cot^{-1} x + \cot^{-1}\frac{1}{x}\right)$ does not exist.

(A) Statement (1) is true, statement (2) is true and statement (2) is correct explanation for Statement (1)
(B) Statement (1) is true, statement (2) is true and statement (2) is NOT the correct explanation for Statement (1)
(C) Statement (1) is true but statement (2) is false
(D) Statement (1) is false but statement (2) is true
(E) Statement (1) is false and statement (2) is false

(SPACE FOR ROUGH WORK)

[COMPREHENSION TYPE]

Q.15 to **20** are based upon a paragraph. Each questions has four choices (A), (B), (C), (D) out of which ***only one*** is correct.

Paragraph for Questions Nos. 15 to 17

A cubic polynomial $f(x) = x^3 + bx^2 + cx + d$ satisfies $f(x) + f(-x) = 0$, $f(1) = 0$ and is defined such that $f^{-1}(x)$ exist and remains in 1st and IIIrd quadrant only. Now $f^{-1}(x)$, $|f^{-1}(x)|$, $f^{-1}(|x|)$ and max $(f(x), f^{-1}(x))$ are plotted.
(where max (a, b) denotes larger of the two real numbers 'a' and 'b')

15. Which of these are identical functions.
(A) $f^{-1}(x)$ and $f^{-1}(|x|)$ (B) $f(x)$ and $f^{-1}(x)$ (C) $f^{-1}(|x|)$ and $|f^{-1}(x)|$ (D) none of these

16. Range of max $\{f(x), f^{-1}(x)\}$ is for $x < -1$
(A) $(-\infty, 0]$ (B) $(-\infty, 0)$ (C) $(-\infty, 0) \cup [1, \infty)$ (D) $[1, \infty)$

17. Roots of the equation $f(x) = f^{-1}(x)$ is
(A) $0, \pm \sqrt{2}$ (B) $0, \pm 1$ (C) $\pm \sqrt{2}$ (D) can't be found

(SPACE FOR ROUGH WORK)

Paragraph for Question Nos. 18 to 20

Let all the inverse trigonometric functions be defined in their respective principle value range.
Find the correct alternative :-

18. $\cos^{-1}x$ is equal to

(A) $\sin^{-1}\sqrt{1-x^2}$ if $-1 < x < 1$

(B) $-\sin^{-1}\sqrt{1-x^2}$ if $-1 < x < 0$

(C) $\sin^{-1}\sqrt{1-x^2}$ if $-1 < x < 0$

(D) $\sin^{-1}\sqrt{1-x^2}$ if $0 < x < 1$

19. $\sin^{-1}x$ is equal to

(A) $\cos^{-1}\sqrt{1-x^2}$ if $-1 < x < 0$

(B) $\cos^{-1}\sqrt{1-x^2}$ if $-1 < x < 1$

(C) $\cos^{-1}\sqrt{1-x^2}$ if $0 < x < 1$

(D) $-\cos^{-1}\sqrt{1-x^2}$ if $0 < x < 1$

20. $\cos^{-1}x$ is equal to

(A) $-\tan^{-1}\frac{\sqrt{1-x^2}}{x}$ if $-1 < x < 0$

(B) $\tan^{-1}\frac{\sqrt{1-x^2}}{x}$ if $-1 < x < 0$

(C) $-\tan^{-1}\frac{\sqrt{1-x^2}}{x}$ if $0 < x < 1$

(D) $\pi + \tan^{-1}\frac{\sqrt{1-x^2}}{x}$ if $-1 < x < 0$

(SPACE FOR ROUGH WORK)

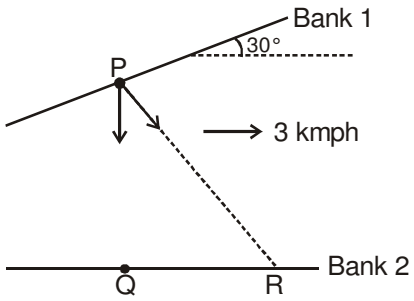
PART - II [PHYSICS]

SECTION - (A)

[STRAIGHT OBJECTIVE TYPE]

Q.1 to ***12*** has four choices (A), (B), (C), (D) out of which ***ONLY ONE*** is correct

1. A top view of a stream whose one of the banks is inclined at 30° to the other is shown in the figure. Velocity of the stream is 3 kmph parallel to bank 2. speed of a man in still water is 4 kmph. The man is supposed to start at P and reach bank 2 in shortest possible time. PQ and PR are directions pependicular to Bank 2 and Bank 1 respectively. Then velocity of man w.r.t stream is :



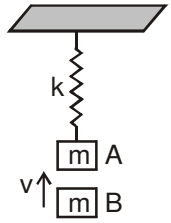
(A) 4 kmph along PQ

(B) 5 kmph along PR

(C) $\sqrt{37}$ kmph between PR and direction of stream velocity

(D) none of these

2. Block 'a' is hanging from a vertical spring and is at rest. Block 'B' strikes the block 'A' with velocity 'v' and sticks to it. Then the value of 'v' for which the spring just attains natural length is :

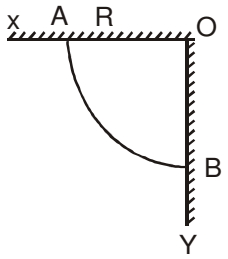


(A) $\sqrt{\frac{60mg^2}{k}}$ (B) $\sqrt{\frac{6mg^2}{k}}$

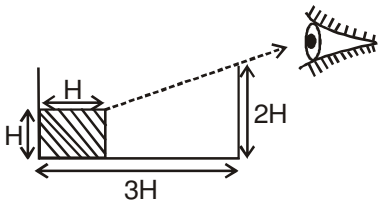
(C) $\sqrt{\frac{10mg^2}{k}}$ (D) None of these

(SPACE FOR ROUGH WORK)

3. A uniform rigid quarter circular ring of radius R and centre O is fixed to horizontal roof OX and vertical Wall OY.
Let the horizontal component of reaction of roof on ring at A be equal to R_1 and the horizontal component of Reaction of wall on Ring at B be equal to R_2 Then we can say that
(A) $R_1 > R_2$ (B) $R_1 = R_2$
(C) $R_1 < R_2$ (D) None of these



4. In the diagram shown, the cylinder has height 2H and diameter 3H. Initially the observer can just see the upper edge of the board. When the cylinder has been completely filled by a liquid of refractive index μ, the observer from the same position can just see the complete board. The board has a square shape with dimensions H × H. Find refrective index of liquid.



(A) $\frac{2.5}{\sqrt{5}}$ (B) $\frac{2\sqrt{2}}{\sqrt{5}}$ (C) $\frac{3}{\sqrt{5}}$ (D) none

5. The equation of a particle executing SHM is given by $x = 3\cos\left(\frac{\pi}{2}\right)t$ cm, where t is in second. The distance travelled by the particle in the first 8.5 sec is :

(A) $\left(24 + \frac{3}{\sqrt{2}}\right)$cm (B) $\left(27 - \frac{3}{\sqrt{2}}\right)$cm (C) $\left(24 - \frac{3}{\sqrt{2}}\right)$cm (D) $\left(27 + \frac{3}{\sqrt{2}}\right)$cm

(SPACE FOR ROUGH WORK)

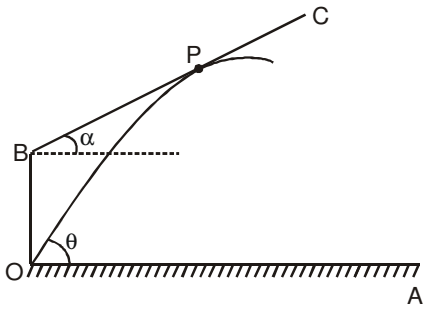
6. A plano-convex lens (refractive indices μ_1) fits exactly into a plano concave lens (refractive indices μ_2) Their plane surfaces are parallel to each other. R is the radius of curvature of the curved surface of the lenses, then focal length of the combination is :

(A) $\frac{R}{\mu_1-\mu_2}$ (B) $\frac{2R}{\mu_2-\mu_1}$ (C) $\frac{R}{2(\mu_1-\mu_2)}$ (D) $\frac{R}{2-(\mu_1+\mu_2)}$

7. A bird in air looks at a fish vertically below it and inside water in a tank. If the distances of the fish as estimated by the bird is h_1 and that of bird as estimated by the fish is h_2, then the refractive index of liquid is :

(A) $\frac{h_2}{h_1}$ (B) $\frac{h_1}{h_2}$ (C) $\frac{h_1-h_2}{h_1+h_2}$ (D) $\frac{h_1+h_2}{h_1-h_2}$

8. A particle is projected from a point O in the horizontal surface OA with speed u and angle of projection θ. It just grazes the plane BC which makes an angle α with the horizontal. The time taken by the projectile to reach p from the instant of projection is



(A) $\frac{2u\sin\theta}{g\cos\alpha}$ (B) $\frac{u\sin\theta}{g\cos\alpha}$

(C) $\frac{u\sin(\theta-\alpha)}{g\cos\alpha}$ (D) None of these

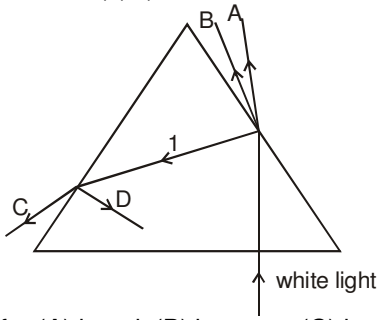
9. The free end of a simple pendulum is attached to the ceiling of a box. The box is taken to a height and the pendulum is oscillated. When the bob is at its lowest point, the box is released to fall freely. As seen from the box during this period, the bob will

(A) continue its oscillation as before (B) stop

(C) will go in a circular path (D) move on a straight line.

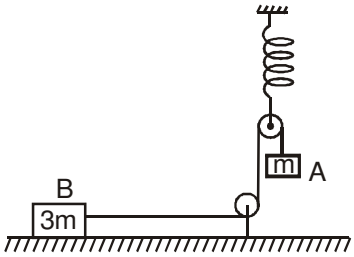
(SPACE FOR ROUGH WORK)

10. A white light ray is incident on a glass prism and it creates three refracted rays A, B & C and one reflected ray D. Select the correct alternatives (s). (1 & D are total internally reflected rays).



(A) Best possible colour for (A) is red. (B) is green, (C) is yellow and (D) is blue
(B) Best possible colour for (A) is red. (B) is yellow, (C) is green and (D) is blue
(C) Best possible colour for (A) is blue. (B) is green, (C) is yellow and (D) is red
(D) Best possible colour for (A) is blue. (B) is yellow, (C) is green and (D) is red

11. In the given figure, string, spring and pulleys are massless. Block A is perforing SHM of amplitude 1 m and time period $\pi/2$ sec. If block B remains at rest, then minimum value of co-efficient of friction between block B and surface will be ($g = 10\ m/s^2$)



(A) $\frac{1}{2}$ (B) $\frac{13}{15}$

(C) $\frac{2}{3}$ (D) none of these

12. You wish to determine the focal length f of a concave spherical mirror. In order to do this, you determine the image distance q for several different values of the object distnace p. How could you use these data to determine f?

(A) Plot p vs q; the slope is f (B) Plot 1/p vs 1/q ; the y - intercept is $1/f$

(C) Plot q vs p; the y-intercept is $1/f$ (D) Plot 1/p vs 1/q; the slope is $1/f$

(SPACE FOR ROUGH WORK)

[REASONING TYPE]

Q.13 to 14 is Reasoning type question, contains Statement-1 (Assertion) and Statement-2 (Reason) Each questions has **five** choices (A), (B), (C), (D), (E) out of which ***only one*** is correct

13. **Statement - 1 :** A convex lens suffers from chromatic aberration.
Statement - 2 : All parallel rays of monochromatic light passing thorugh a convex lens do not come to a focus at the same point.
(A) Statement (1) is true, statement (2) is true and statement (2) is correct explanation for Statement (1)
(B) Statement (1) is true, statement (2) is true and statement (2) is NOT the correct explanation for Statement (1)
(C) Statement (1) is true but statement (2) is false
(D) Statement (1) is false but statement (2) is true
(E) Statement (1) is false and statement (2) is false

14. **Statement - 1 :** When light travels from denser to rarer medium the critcal angle of incidence have different values for different wavelengths of light.
because
Statement - 2 : Refractive index of a medium varies with wavelength of light.
(A) Statement (1) is true, statement (2) is true and statement (2) is correct explanation for Statement (1)
(B) Statement (1) is true, statement (2) is true and statement (2) is NOT the correct explanation for Statement (1)
(C) Statement (1) is true but statement (2) is false
(D) Statement (1) is false but statement (2) is true
(E) Statement (1) is false and statement (2) is false

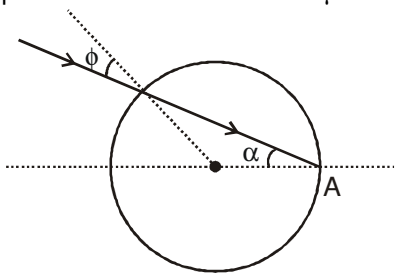
(SPACE FOR ROUGH WORK)

[COMPREHENSION TYPE]

Q.15 to **20** are based upon a paragraph. Each questions has four choices (A), (B), (C), (D) out of which ***only one*** is correct.

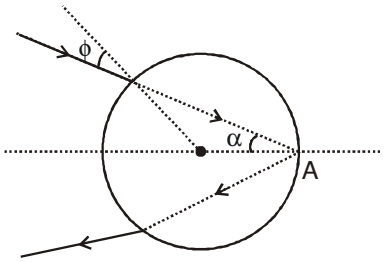
Paragraph for Questions Nos. 15 to 17

A ray of light enters a spherical drop of water of refractive index μ are shown in the figure.



15. Select the correct Statement :
(A) Incident rays are partially reflected at point A
(B) Incident ray are totally reflected at point A
(C) Incident ray are totally transmitted through A
(D) None of these

16. An expression of the angle between incidence ray and emergent ray (angle of deviation) as shown in the figure is



(A) $0°$ (B) ϕ
(C) $\alpha - \phi$ (D) $\pi - 4\alpha + 2\phi$

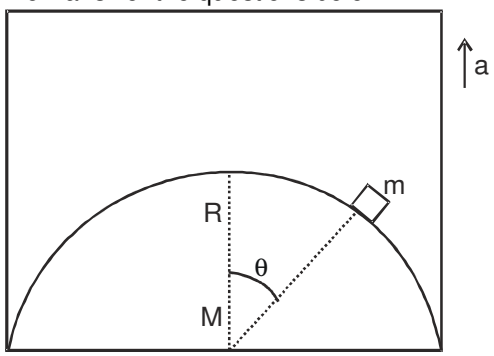
17. Consider the figure of questions 16, the angle ϕ for which minimum deviation is produced will be

(A) $\cos^2\phi = \frac{\mu^2+1}{3}$ (B) $\cos^2\phi = \frac{\mu^2-1}{3}$ (C) $\sin^2\phi = \frac{\mu^2+1}{3}$ (D) $\sin^2\phi = \frac{\mu^2-1}{3}$

(SPACE FOR ROUGH WORK)

Paragraph for Question Nos. 18 to 20

Read the following write up carefully and answer the following questions :
A hemisphere of mass M and radius R is kept inside a lift going upwards with an acceleration a : A block of mass 'm' is kept as shown in the figure. Now answer the questions below :



18. If the block is at rest with respect to hemisphere, the minimum coefficient of friction between the block and the hemisphere will be :

(A) $\tan\theta$ (B) $\cot\theta$ (C) $\frac{a}{g}\tan\theta$ (D) $\frac{a}{g}\cot\theta$

19. The net reaction from the hemisphere on the block of mass 'm' is
(A) $m(g + a)\cos\theta$ (B) $m(g + a)\sin\theta$ (C) mg (D) $mg + ma$

20. If there was no friction between the block and the hemisphere, the speed of the block as it reaches the bottom of the hemisphere, in the frame of the lift is : (Assume the normal reaction between block and hemisphere never become to zero)

(A) $\sqrt{2gR\cos\theta}$ (B) $\sqrt{2(g+a)R\cos\theta}$ (C) $\sqrt{2(g+a)R\sin\theta}$ (D) None of these

(SPACE FOR ROUGH WORK)

PART - III [CHEMISTRY]

SECTION - (A)

[STRAIGHT OBJECTIVE TYPE]

Q.1 to ***12*** has four choices (A), (B), (C), (D) out of which ***ONLY ONE*** is correct

1. 1 mole mixture of CO and CO_2 requires exactly 28 g of KOH in solution for complete conversion of all the CO_2 into K_2CO_3. How much amount more of KOH will be required for conversion into K_2CO_3 if one mole of mixture is completely oxidized to CO_2.

(A) 28 g (B) 56 g (C) 84 g (D) 112 g

2. 250 ml of 0.1 M HCl and 250 ml of 0.1 M KOH, both being at the same temperature, are mixed thoroughly and the temperature rise is found to be ΔT_1. If the experiment is repeated using 500 ml each of the two solutions and ΔT_2 is the temperature rise, then which is true?

(A) $\Delta T_2 > 2\Delta T_1$ (B) $\Delta T_1 = 2\ \Delta T_2$ (C) $\Delta T_1 = \Delta T_2$ (D) None of these

3. Heat of neutralization of strong acid HA and a weaker acid HB with KOH are –13.7 and –12.7 k cal mol^{-}. When 1 mole of KOH was added to a mixture containing 1 mole each of HA and HB, the heat change was –13.5 kcal. In what ratio is the base distributed between HA and HB.

(A) 3 : 1 (B) 1 : 3 (C) 4 : 1 (D) 1 : 4

4. 50 ml of 0.04 M solution of sodium sesquicarbonate ($Na_2CO_3.NaHCO_3.2H_2O$) is titrated with 0.05 M HCl. V_1 ml of HCl is used when phenolphthalein acts as indicator and V_2 ml of the HCl is used when methyl orange is the indicator in the two separate titrations. The two titration values V_1 and V_2 differ by

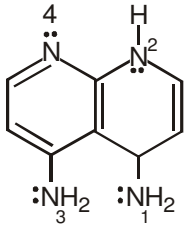
(A) 40 ml (B) 50 ml (C) 60 ml (D) 80 ml

(SPACE FOR ROUGH WORK)

5. The heats of combustion of C_xH_y, carbon and hydrogen are a, b and c cal respectively. The heat of formation of C_xH_y will be

(A) $\left(-xb+\frac{yc}{2}+\frac{a}{2}\right)$cal (B) $-\left(xb+\frac{yc}{2}-a\right)$cal (C) $\left(xb-\frac{yc}{2}+\frac{a}{2}\right)$cal (D) $\left(xb-\frac{yc}{2}-\frac{a}{c}\right)$cal

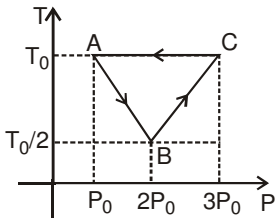
6. The correct basicity of various atoms in increasing order is :



(A) 1 > 4 > 2 > 3 (B) 2 < 3 < 4 < 1

(C) 3 < 2 < 1 < 4 (D) 3 < 2 < 4 < 1

7. One mole of an ideal gas is taken through processes AB, BC and CA as shown in the figure. Which of the following is incorrect :



(A) The heat absorbed in process AC is $-RT_0 \ln 3$

(B) The work done in path CA is $-RT_0 \ln 3$

(C) Volume is increasing from A to B in process AB

(D) Volume is increasing from B to C in process BC

8. The negative charge of the anion formed by removal of phenolic hydrogen by a base in m–nitro phenol resides on :

(A) Only oxygen directly attached with benzene ring

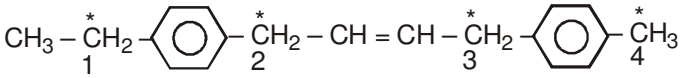
(B) All the carbon atoms and all the three oxygen atoms

(C) Three carbon atoms and three oxygen atoms.

(D) One oxygen atom and three carbon atoms.

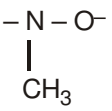
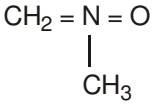
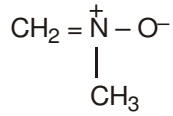
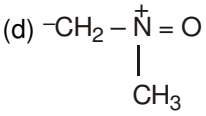
(SPACE FOR ROUGH WORK)

9. Compare the bond enegies of the C – H bonds in decreasing order



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

10. The internal energy order of the following resonating structures is :

(a)  (b)  (c)  (d) 

(A) (b) < (c) < (d) < (a) (B) (b) > (a) > (d) > (c) (C) (a) > (b) > (d) > (c) (D) (c) < (a) < (d) < (b)

11. Heat of neutralisation of oxalic acid is –25.4 kcal mol^{-1} using strong base NaOH, hence enthalpy change of this process $H_2C_2O_4 \rightleftharpoons 2H^+ + C_2O_4^{2-}$ is :

(A) 2.0 kcal (B) 4 kcal (C) 1.0 kcal (D) 3 kcal

12. Which of the following statement is incorrect (Consider only structural isomers):

(A) Total no. of isomer of $C_3H_5Cl_3$ is 5

(B) Total no. of isomer of $C_3H_6Cl_2$ is 4

(C) The minimum no. of Carbon in a compound which shows structural isomerism is 4.

(D) Total no. of alcohols of $C_5H_{12}O$ is 8

(SPACE FOR ROUGH WORK)

[REASONING TYPE]

Q.13 to 14 is Reasoning type question, contains Statement-1 (Assertion) and Statement-2 (Reason) Each questions has **five** choices (A), (B), (C), (D), (E) out of which ***only one*** is correct

13. **Statement–1 :** Dichromate ion in acidic medium oxidizes stannous ion as:

$x\,Sn^{2+} + yCr_2O_7^{2-} + zH^+ \rightarrow a\,Sn^{4+} + bCr^{3+} + cH_2O$

The ratio x : y in it is 1 : 3

Statement–2 : The value of x + y + z = 18.

(A) Statement (1) is True, statement (2) is True and statement (2) is correct explanation for Statement (1)

(B) Statement (1) is True, statement (2) is True and statement (2) is NOT the correct explanation for Statement (1)

(C) Statement (1) is true, statement (2) is false

(D) Statement (1) is false, statement (2) is true

(E) Both Statements are false

14. **Statement–1 :** The work done in an isothermal expansion is more in magnitude as compared to that involved in adiabatic expansion.

Statement–2 : In the graph of pressure (P on y-axis) against volume (V on x -axis), the curve decreases more rapidly for reversible adiabatic expansion than in the P–V graph (P on y-axis and V on x-axis) for reversible isothermal expansion starting from same initial state.

(A) Statement (1) is True, statement (2) is True and statement (2) is correct explanation for Statement (1)

(B) Statement (1) is True, statement (2) is True and statement (2) is NOT the correct explanation for Statement (1)

(C) Statement (1) is true, statement (2) is false

(D) Statement (1) is false, statement (2) is true

(E) Both Statements are false

(SPACE FOR ROUGH WORK)

[COMPREHENSION TYPE]

Q.15 to **20** are based upon a paragraph. Each questions has four choices (A), (B), (C), (D) out of which ***only one*** is correct.

Paragraph for Questions Nos. 15 to 17

The change in internal energy (U) can be brought about in two ways.
(i) Either by allowing the heat to flow into the system or out of the system.
(ii) By doing work on the system or the work done by the system
Using the symbol q to represent heat transferred to system and using work done by the system –w, we can represent the internal energy change of a system, ΔU, as :
$q = \Delta U + (-w)$ (first law of thermodynamics)
If the reaction is carried out in a closed container with constant volume, so that $\Delta V = 0$
Hence, $q_v = \Delta U$
On the other hand, if a reaction is carried out in open vessel that keeps the pressure constant and allows the volume of the system to change freely. In such ease, $\Delta V \neq 0$ and
$-w = P.\ \Delta V$.
Hence, $q_p = \Delta U + P\Delta V$
Also, $q_p = q_v + \Delta n_g RT$
As, reactions carried out at constant pressure are so common, the heat change for such process is given a special symbol ΔH, called the enthalpy change of the reaction. The enthalpy (H) of the system is the name given to the quantity (U + PV).

15. In which of the following cases ΔH and ΔU are not equal to each other ?
(A) The reaction involves no gaseous reactant and product
(B) The number of moles of gaseous reactant and gaseous products is not equal to each other
(C) The number of moles of gaseous reactant and gaseous products is equal to each other
(D) The process is carried out in closed vessel

16. The latent heat of vaporization of liquid at 500 K and 1 atmospheric pressure is 10.0 kcal/mol. What will be the change in internal energy of 3 moles of the liquid at the same temperature and pressure?
(A) 27.0 kcal (B) 13.0 kcal (C) –27.0 kcal (D) –13.0 kcal

17. A mixture of 2 moles of carbon monoxide and one mole of oxygen in a closed vessel is ignited to get carbon dioxide. If ΔH is the enthalpy change and ΔU is the change in internal energy, then
(A) $\Delta H > \Delta U$ (B) $\Delta H < \Delta U$ (C) $\Delta H = \Delta U$ (D) Not definite

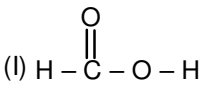
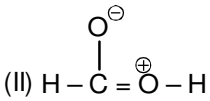
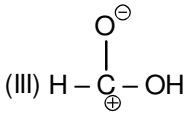
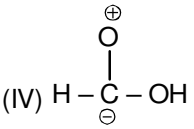
(SPACE FOR ROUGH WORK)

Paragraph for Question Nos. 18 to 20

Delocalisation of electrons take place in alternate single and multiple bonds involving carbon atoms. Delocalisation may also occur in a conjugated system involving carbon atom and atom other than the carbon. There are also examples in which pi orbital and p orbital (vacant or half-filled or filled) overlap. Thus delocalisation are of the following types:
(i) delocalisation by π, π overlap
(ii) delocalisation by π, p overlap
Delocalisation makes system stable. More is the number of resonating structures more is the stability of the system.

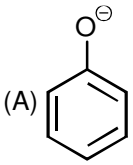
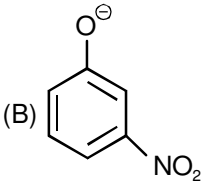
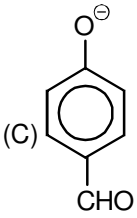
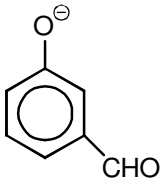
18. In which of the following compounds delocalisation is not possible:
(A) 1,4-pentadiene (B) 1,3-butadiene (C) 1,3,5-hexatriene (D) benzene

19. Arrange the following resonating structures of formic acid in decreasing order of stability.

(I) 
(II) 
(III) 
(IV) 

(A) I > II > IV > III (B) I > II > III > IV (C) IV > III > II > I (D) none of these

20. Which one of the following anion is most stable due to the delocalisation?

(A) 
(B) 
(C) 
(D) 

(SPACE FOR ROUGH WORK)