Question Paper Stream- SA
Part-1 Mathematics

Question Number : 1

Suppose the quadratic polynomial $P(x) = ax^2 + bx + c$ has positive coefficients a, b, c in arithmetic progression in that order. If $P(x) = 0$ has integer roots α and β. then $\alpha + \beta + \alpha\beta$ equals

A. 3 B. 5 C. 7 D. 14

Question Number : 2

The number of digits in the decimal expansion of $16^5 5^{16}$ is

A. 16 B. 17 C. 18 D. 19

Question Number : 3

Let t be real number such that $t^2 = at + b$ for some positive integers a and b. Then for any choice of positive integers a and b, t^3 is never equal to

A. $4t + 3$ B. $8t + 5$ C. $10t + 3$ D. $6t + 5$

Question Number : 4

Consider the equation $(1 + a + b)^2 = 3(1 + a^2 + b^2)$, where a, b are real numbers. Then

A. there is no solution pair (a, b)
B. there are infinitely many solution pairs (a, b)
C. there are exactly two solution pairs (a, b)
D. there is exactly one solution pair (a, b)

Question Number : 5

Let $a_1, a_2, \cdots, a_{100}$ be non-zero real numbers such that

$$a_1 + a_2 + \cdots + a_{100} = 0.$$

Then

A. $\sum_{i=1}^{100} a_i 2^{a_i} > 0$ and $\sum_{i=1}^{100} a_i 2^{-a_i} < 0$

B. $\sum_{i=1}^{100} a_i 2^{a_i} \geq 0$ and $\sum_{i=1}^{100} a_i 2^{-a_i} \geq 0$

C. $\sum_{i=1}^{100} a_i 2^{a_i} \leq 0$ and $\sum_{i=1}^{100} a_i 2^{-a_i} \leq 0$

D. the sign of $\sum_{i=1}^{100} a_i 2^{a_i}$ or $\sum_{i=1}^{100} a_i 2^{-a_i}$ depends on the choice of a_i's

Question Number : 6

Let $ABCD$ be a trapezium, in which AB is parallel to CD, $AB = 11$, $BC = 4$, $CD = 6$ and $DA = 3$. The distance between AB and CD is

A. 2
B. 2.4
C. 2.8
D. not determinable with the data

Question Number : 7

The points A, B, C, D, E are marked on the circumference of a circle in clockwise direction such that $\angle ABC = 130°$ and $\angle CDE = 110°$. The measure of $\angle ACE$ in degrees is

A. 50°
B. 60°
C. 70°
D. 80°

Question Number : 8

Three circles of radii 1, 2 and 3 units respectively touch each other externally in the plane. The circumradius of the triangle formed by joining the centers of the circles is

A. 1.5
B. 2
C. 2.5
D. 3

Question Number : 9

Let P be a point inside a triangle ABC with $\angle ABC = 90°$. Let P_1 and P_2 be the images of P under reflection in AB and BC respectively. The distance between the circumcenters of triangles ABC and P_1PP_2 is

A. $\frac{AB}{2}$
B. $\frac{AP+BP+CP}{3}$
C. $\frac{AC}{2}$
D. $\frac{AB+BC+AC}{2}$

Question Number : 10

Let a and b be two positive real numbers such that $a + 2b \leq 1$. Let A_1 and A_2 be, respectively, the areas of circles with radii ab^3 and b^2. Then the maximum possible value of $\frac{A_1}{A_2}$ is

A. $\frac{1}{16}$
B. $\frac{1}{64}$
C. $\frac{1}{16\sqrt{2}}$
D. $\frac{1}{32}$

Question Number : 11

There are two candles of same length and same size. Both of them burn at uniform rate. The first one burns in 5 hours and the second one burns in 3 hours. Both the candles are lit together. After how many minutes the length of the first candle is 3 times that of the other?

A. 90 B. 120 C. 135 D. 150

Question Number : 12

Consider a cuboid all of whose edges are integers and whose base is a square. Suppose the sum of all its edges is numerically equal to the sum of the areas of all its six faces. Then the sum of all its edges is

A. 12 B. 18 C. 24 D. 36

Question Number : 13

Let $A_1, A_2, \ldots, A_m$ be non-empty subsets of $\{1,2,3,\ldots,100\}$ satisfying the following conditions:

(1) the numbers $|A_1|, |A_2|, \ldots, |A_m|$ are distinct:

(2) $A_1, A_2, \ldots, A_m$ are pairwise disjoint.

(Here $|A|$ denotes the number of elements in the set A.)

Then the maximum possible value of m is

A. 13 B. 14 C. 15 D. 16

Question Number : 14

The number of all 2-digit numbers n, such that n is equal to the sum of the square of digit in its tens place and the cube of the digit in units place is

A. 0 B. 1 C. 2 D. 4

Question Number : 15

Let f be a function defined on the set of all positive integers such that $f(xy) = f(x) + f(y)$ for all positive integers x, y. If $f(12) = 24$ and $f(8) = 15$. the value of $f(48)$ is

A. 31 B. 32 C. 33 D. 34

Part-1 Physics

Question Number : 16

A person walks 25.0° north of east for 3.18 km. How far would she have to walk due north and then due east to arrive at the same location?

A. towards north 2.88 km and towards east 1.34 km.

B. towards north 2.11 km and towards east 2.11 km

C. towards north 1.25 km and towards east 1.93 km

D. towards north 1.34 km and towards east 2.88 km.

Question Number : 17

The length and width of a rectangular room are measured to be 3.95=0.05 m and 3.05=0 05 m, respectively. The area of the floor is

A. 12.05=0.01 m^2

B. 12.05=0.005 m^2

C. 12.05=0.34 m^2

D. 12.05=0.40 m^2

Question Number : 18

A car goes around uniform circular track of radius R at a uniform speed v once in every T seconds. The magnitude of the centripetal acceleration is a_c. If the car now goes uniformly around a larger circular track of radius $2R$ and experiences a centripetal acceleration of magnitude $8a_c$, then its time period is

A. $2T$

B. $3T$

C. $T/2$

D. $3/2\ T$

Question Number : 19

The primary and the secondary coils of a transformer contain 10 and 100 turns, respectively. The primary coil is connected to a battery that supplies a constant voltage of 1.5 volts. The voltage across the secondary coil is

A. 1.5 V

B. 0.15 V

C. 0.0 V

D. 15 V

Question Number : 20

Water falls down a 500.0 m shaft to reach a turbine which generates electricity. How much water must fall per second in order to generate $1.00 \cdot 10^9$ Watts of power? (Assume 50 % efficiency of conversion and g= 10 m/s^2)

A. 250 m^3

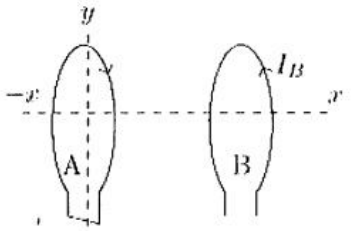
B. 400 m^3

C. 500 m^3

D. 200 m^3

Question Number : 21

The diagram below shows two circular loops of wire (A and B) centred on and perpendicular to the x-axis, and oriented with their planes parallel to each other. The y-axis passes vertically through loop A (dashed line). There is a current I_B in loop B as shown. Possible actions which we might perform on loop A are:



(i) Move A to the right along x axis closer to B

(ii) Move A to the left along x axis away from B

(iii) As viewed from above, rotate A clockwise about y axis

(iv) As viewed from above, rotate A anticlockwise about y axis

Which of these actions will induce a current in A only in the direction shown.

A. Only (i)

B. Only (ii)

C. Only(i) and (iv)

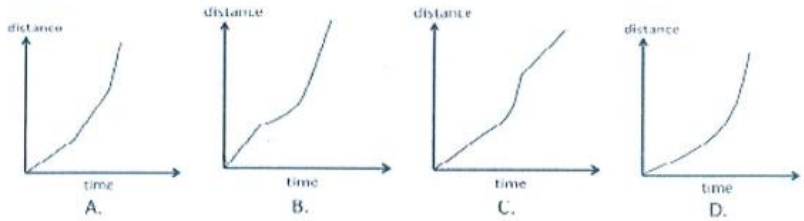
D. Only (ii) and (iii)

Question Number : 22

A rigid ball rolls without slipping on a surface shown below.

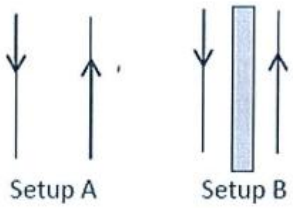


Which one of the following is the most likely representation of the distance travelled by the ball vs time graph?



Question Number : 23

In an experiment, setup A consists of two parallel wires which carry currents in opposite directions as shown in the figure. A second setup B is identical to setup A, except that there is a metal plate between the wires.



Let F_A and F_B be the magnitude of the force between the two wires in setup A and setup B. respectively.

A. $F_A > F_B \neq 0$

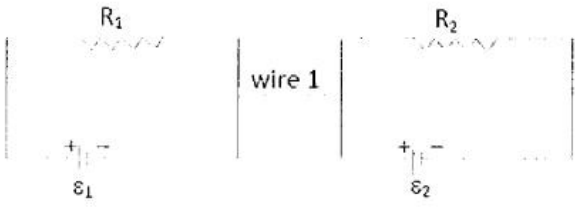
B. $F_A < F_B$

C. $F_A = F_B \neq 0$

D. $F_A > F_B = 0$

Question Number : 24

In the circuit, wire 1 is of negligible resistance. Then



A. Current will flow through wire 1 if $\varepsilon_1 \neq \varepsilon_2$

B. Current will flow through wire 1 if $\varepsilon_1/R_1 \neq \varepsilon_2/R_2$

C. Current will flow through wire 1 if $(\varepsilon_1+\varepsilon_2)/(R_1+R_2) \neq (\varepsilon_1-\varepsilon_2)/(R_1-R_2)$

D. No current will flow through wire 1.

Question Number : 25

The radius of a nucleus is given by $r_0A^{1/3}$ where $r_0 = 1.3 \cdot 10^{-15}$ m and A is the mass number of the nucleus. The Lead nucleus has $A = 206$. The electrostatic force between two protons in this nucleus is approximately

A. 10^2 N

B. 10^7 N

C. 10^{12} N

D. 10^{17} N

Question Number : 26

A hollow lens is made of thin glass and in the shape of a double concave lens. It can be filled with air, water of refractive index 1.33 or CS_2 of refractive index 1.6. It will act as a diverging lens if it is

A. filled with air and immersed in water.

B. filled with water and immersed in CS_2.

C. filled with air and immersed in CS_2.

D. filled with CS_2 and immersed in water.

Question Number : 27

A stone thrown down with a speed u takes a time t_1 to reach the ground, while another stone, thrown upwards from the same point with the same speed, takes time t_2. The maximum height the second stone reaches from the ground is

A. $\frac{1}{2} gt_1t_2$

B. $g\ S\ (t_1 + t_2)^2$

C. $g\ S\ (t_1 - t_2)^2$

D. $\frac{1}{2} gt_2^2$

Question Number : 28

An electric field due to a positively charged long straight wire at a distance r from it is proportional to r^{-1} in magnitude. Two electrons are orbiting such a long straight wire in circular orbits of radii 1 Å and 2 Å. The ratio of their respective time periods is

A. 1:1 B. 1:2 C. 2:1 D. 4:1

Question Number : 29

Two particles of identical mass are moving in circular orbits under a potential given by $V(r) = Kr^{-n}$, where K is a constant. If the radii of their orbits are r_1, r_2 and their speeds are v_1; v_2, respectively, then

A. $v_1^2 r_1^n = v_2^2 r_2^n$

B. $v_1^2 r_1^{-n} = v_2^2 r_2^{-n}$

C. $v_1^2 r_1 = v_2^2 r_2$

D. $v_1^2 r_1^{2-n} = v_2^2 r_2^{2-n}$

Question Number : 30

Mercury is often used in clinical thermometers. Which one of the following properties of mercury is not a reason for this?

A. The coefficient of the thermal expansion is large.

B. It is shiny.

C. It is a liquid at room temperature.

D. It has high density.

Part-I Chemistry

Question Number : 31

One mole of one of the sodium salts listed below, having carbon content close to 14.3%, produces 1 mole of carbon dioxide upon heating (atomic mass Na = 23, H = 1, C = 12, O = 16). The salt is

A. C_2H_5COONa

B. $NaHCO_3$

C. $HCOONa$

D. CH_3COONa

Question Number : 32

Among formic acid, acetic acid, propanoic acid and phenol, the strongest acid in water is

A. formic acid

B. acetic acid

C. propanoic acid

D. phenol

Question Number : 33

According to Graham's Law, the rate of diffusion of CO, O_2, N_2 and CO_2 follows the order:

A. $CO = N_2 > O_2 > CO_2$

B. $CO = N_2 > CO_2 > O_2$

C. $O_2 > CO = N_2 > CO_2$

D. $CO_2 > O_2 > CO = N_2$

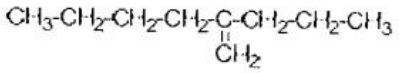
Question Number : 34

The major product formed when 2-butene is reacted with O_3 followed by treatment with Zn/H_2O is

A. CH_3COOH
B. CH_3CHO
C. CH_3CH_2OH
D. $CH_2=CH_2$

Question Number : 35

The IUPAC name for the following compound is



A. 2-propylhex-1-ene
B. 2-butylpent-1-ene
C. 2-propyl-2-butylethene
D. propyl-1-butylethene

Question Number : 36

The major products obtained in the reaction of oxalic acid with conc. H_2SO_4 upon heating are

A. CO, CO_2, H_2O
B. CO, SO_2, H_2O
C. H_2S, CO, H_2O
D. HCOOH, H_2S, CO

Question Number : 37

LiOH reacts with CO_2 to form Li_2CO_3 (atomic mass of Li = 7). The amount of CO_2 (in g) consumed by 1 g of LiOH is closest to

A. 0.916
B 1.832
C 0.544
D. 1.088

Question Number : 38

The oxidation number of sulphur is −4 in

A. H_2S
B. CS_2
C. Na_2SO_4
D. Na_2SO_3

Question Number : 39

Al_2O_3 reacts with

A. only water
B. only acids
C. only alkalis
D. both acids and alkalis

Question Number : 40

The major product formed in the oxidation of acetylene by alkaline $KMnO_4$ is

A. ethanol
B. acetic acid
C. formic acid
D. oxalic acid

Question Number : 41

In a closed vessel, an ideal gas at 1 atm is heated from 27 °C to 327 °C. The final pressure of the gas will approximately be

A. 3 atm
B. 0.5 atm
C. 2 atm
D. 12 atm

Question Number : 42

Among the elements Li, N, C and Be, one with the largest atomic radius is

A. Li
B. N
C. C
D. Be

Question Number : 43

A redox reaction among the following is

(i) $CdCl_2 + 2\,KOH \rightarrow Cd(OH)_2 - 2\,KCl$

(ii) $BaCl_2 + K_2SO_4 \rightarrow BaSO_4 - 2\,KCl$

(iii) $CaCO_3 \rightarrow CaO - CO_2$

(iv) $2\,Ca + O_2 \rightarrow 2\,CaO$

A. (i)

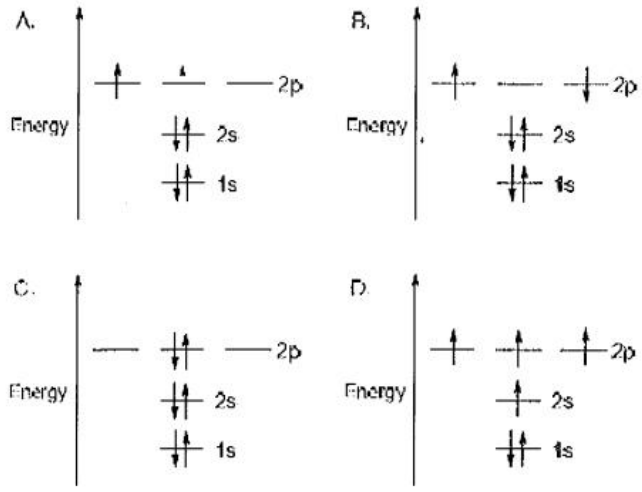
B (ii)

C. (iii)

D. (iv)

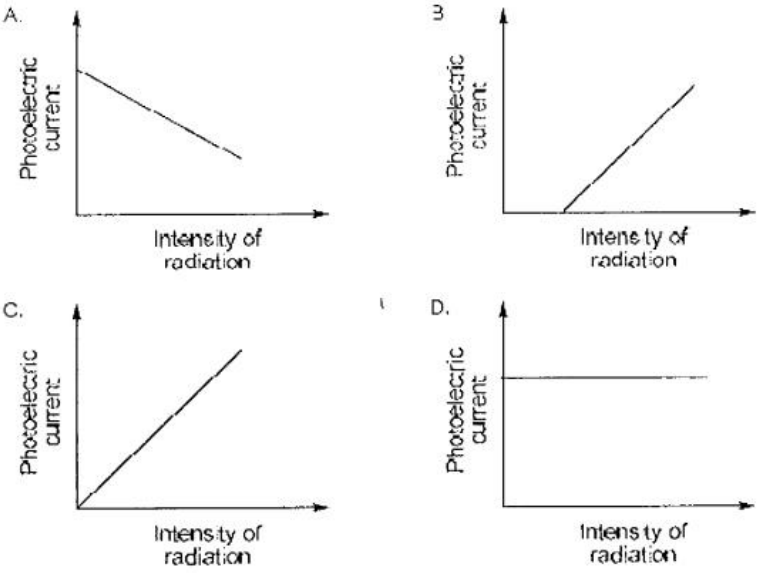
Question Number : 44

The electronic configuration which obeys Hund's rule for the ground state of carbon atom is



Question Number : 45

The graph that depicts Einstein's photoelectric effect for a monochromatic source of frequency above the threshold frequency is



Part-1 Biology

Question Number : 46

What is the length of human DNA containing 6.6×10^9 bp?

A. 22 nm

B. 0.22 mm

C. 2.2 m

D. 22 m

Question Number : 47

The *Diptheria, Pertussis, Tetanus* (DPT) vaccine consists of

A. live attenuated strains of *Diptheria, Pertussis, Tetanus*

B. toxoid of *Diptheria , Tetanus*, and heat killed whole cells of *Pertussis*

C. whole cell lysate of *Diptheria, Pertussis, Tetanus*

D. heat killed strains of *Diptheria, Pertussis, Tetanus*

Question Number : 48

Which of the following is NOT an enzyme?

A. Lipase

B. Amylase

C. Trypsin

D. Bilirubin

Question Number : 49

The pH of the avian blood is maintained by

A. HCO_3^-

B. $H_2PO_4^-$

C. CH_3COO^-

D. Cl^-

Question Number : 50

Podocyte layer that provides outer lining to the surface of glomerular capillaries are found in

A. bowman's capsule
B. loop of Henle
C. renal artery
D. ureter

Question Number : 51

If a dsDNA has 20% adenine, what would be its cytosine content?

A. 20%
B. 30%
C. 40%
D. 80%

Question Number : 52

Which one of the following is incapable of curing Pellagra?

A. Niacine
B. Nicotine
C. Nicotinamide
D. Tryptophan

Question Number : 53

In *Escherichia coli*, how many codons code for the standard amino-acids?

A. 64
B. 60
C. 61
D. 20

Question Number : 54

Bombyx mori (silk worm) belongs to the order

A. Lepidoptera
B. Diptera
C. Hymenoptera
D. Coleoptera

Question Number : 55

The source of mammalian hormone "Relaxin" is

A. ovary
B. stomach
C. intestine
D. pancreas

Question Number : 56

Which one of the following animals is a connecting link between reptiles and mammals?

A. Platypus

B. Bat

C. Armadillo

D. Frog

Question Number : 57

What is the number of chromosomes in an individual with Turner's syndrome?

A. 44

B. 45

C. 46

D. 47

Question Number : 58

Chipko movement in the year 1974 in Garhwal Himalayas involved

A. protecting tigers
B. preventing soil erosion by planting trees
C. preventing pollution by closing down industries
D. hugging trees to prevent the contractors from felling them

Question Number : 59

Which of the following amino acids is NOT involved in gluconeogenesis?

A. Alanine
B. Lysine
C. Glutamate
D. Arginine

Question Number : 60

Which of the following entities causes syphilis?

A. *Treponema pallidum*
B. *Neisseria gonorrhoea*
C. *HIV*
D. *Hepatitis B*

Part-11 Mathematics

Question Number : 61

Suppose a is a positive real number such that $a^5 - a^3 + a = 2$. Then

A. $a^6 < 2$ B. $2 < a^6 < 3$

C. $3 < a^6 < 4$ D. $4 \leq a^6$

Question Number : 62

Consider the quadratic equation $nx^2 + 7\sqrt{n}\,x + n = 0$, where n is a positive integer. Which of the following statements are necessarily correct?

I. For any n, the roots are distinct.

II. There are infinitely many values of n for which both roots are real.

III. The product of the roots is necessarily an integer.

A. III only B. I and III only

C. II and III only D. I, II and III

Question Number : 63

Consider a semicircle of radius 1 unit constructed on the diameter AB, and let O be its centre. Let C be a point on AO such that $AC:CO = 2:1$. Draw CD perpendicular to AO with D on the semicircle. Draw OE perpendicular to AD with E on AD. Let OE and CD intersect at H. Then DH equals

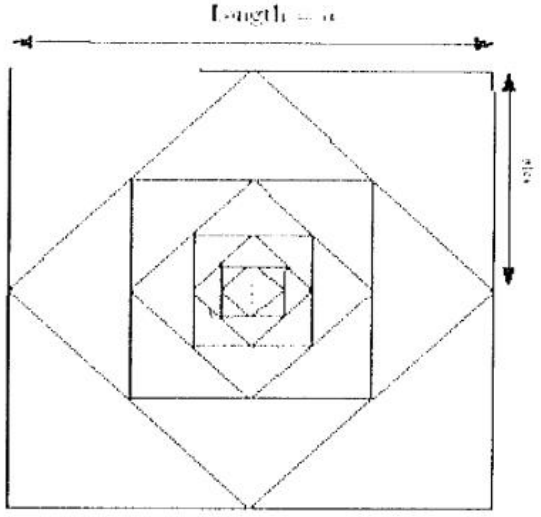
A. $\frac{1}{\sqrt{5}}$ B. $\frac{1}{\sqrt{3}}$

C. $\frac{1}{\sqrt{2}}$ D. $\frac{\sqrt{5}-1}{2}$

Question Number : 64

Let S_1 be the sum of areas of the squares whose sides are parallel to coordinate axes. Let S_2 be the sum of areas of the slanted squares as shown in the figure. Then S_1/S_2 is

A. 2 B. $\sqrt{2}$ C. 1 D. $\frac{1}{\sqrt{2}}$



Question Number : 65

If a 3-digit number is randomly chosen, what is the probability that either the number itself or some permutation of the number (which is a 3-digit number) is divisible by 4 and 5?

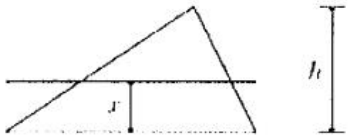
A. $\frac{1}{45}$ B. $\frac{29}{180}$

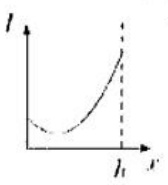
C. $\frac{11}{60}$ D. $\frac{1}{4}$

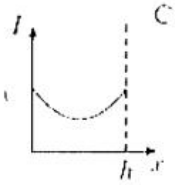
Part-11 Physics

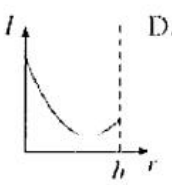
Question Number : 66

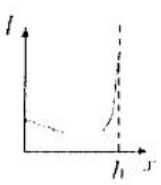
Which one of the following four graphs best depict the variation with x of the moment of inertia I of a uniform triangular lamina about an axis parallel to its base at a distance x from it:



A. 

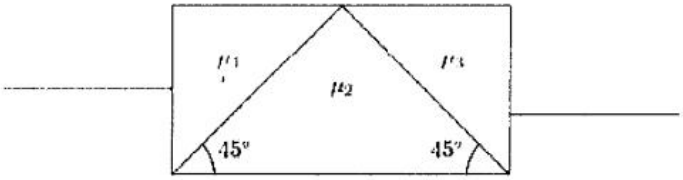
B. 

C. 

D. 

Question Number : 67

A rectangular block is composed of three different glass prisms (with refractive indices μ_1, μ_2 and μ_3) as shown in the figure below. A ray of light incident normal to the left face emerges normal to the right face. Then the refractive indices are related by



A. $\mu_1^2 + \mu_2^2 = 2\mu_3^2$

B. $\mu_1^2 + \mu_2^2 = \mu_3^2$

C. $\mu_1^2 + \mu_3^2 = 2\mu_2^2$

D. $\mu_2^2 + \mu_3^2 = 2\mu_1^2$

Question Number : 68

A uniform metal plate shaped like a triangle ABC has a mass of 540 gm. The length of the sides AB, BC, and CA are 3 cm, 5 cm and 4 cm, respectively. The plate is pivoted freely about the point A. What mass must be added to a vertex, so that the plate can hang with the long edge horizontal?

A. 140 gm at C

B. 540 gm at C

C. 140 gm at B

D. 540 gm at B

Question Number : 69

A 20 gm bullet whose specific heat is 5000 J (kg-°C) and moving at 2000 m·s plunges into a 1.0 kg block of wax whose specific heat is 3000 J (kg-°C). Both bullet and wax are at 25 °C and assume that (i) the bullet comes to rest in the wax and (ii) all its kinetic energy goes into heating the wax. Thermal temperature of the wax in °C is close to

A. 28.1

B. 31.5

C. 37.9

D. 42.1

Question Number : 70

A "V" shaped rigid body has two identical uniform arms. What must be the angle between the two arms so that when the body is hung from one end, the other arm is horizontal?

A. $\cos^{-1}(1/3)$

B. $\cos^{-1}(1/2)$

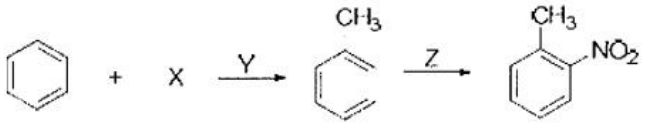
C. $\cos^{-1}(1/4)$

D. $\cos^{-1}(1/6)$

Part-II Chemistry

Question Number : 71

In the following reactions, X, Y and Z are



A. X = CH_3Cl; Y = anhydrous $AlCl_3$; Z = $HNO_3 + H_2SO_4$

B. X = CH_3COCl; Y = anhydrous $AlCl_3$; Z = $HNO_3 + H_2SO_4$

C. X = CH_3Cl; Y = conc. H_2SO_4; Z = $HNO_3 + H_2SO_4$

D. X = CH_3Cl; Y = dil. H_2SO_4; Z = HNO_3

Question Number : 72

2,3-Dibromobutane can be converted to 2-butyne in a two-step reaction using

A. (i) HCl and (ii) NaH

B. (i) alcoholic KOH and (ii) $NaNH_2$

C. (i) Na and (ii) NaOH

D. (i) Br_2 and (ii) NaH

Question Number : 73

Given

$NO(g) + O_3(g) \longrightarrow NO_2(g) + O_2(g)$ $\Delta H = -198.9$ kJ/mol

$O_3(g) \longrightarrow 3/2\ O_2(g)$ $\Delta H = -142.3$ kJ/mol

$O_2(g) \longrightarrow 2\ O(g)$ $\Delta H = +495.0$ kJ/mol

The enthalpy change (ΔH) for the following reaction is

$NO(g) + O(g) \longrightarrow NO_2(g)$

A. -304.1 kJ/mol B. +304.1 kJ/mol

C. -403.1 kJ/mol D. +403.1 kJ/mol

Question Number : 74

A 1.85 g sample of an arsenic-containing pesticide was chemically converted to AsO_4^{3-} (atomic mass of As = 74.9) and titrated with Pb^{2+} to form $Pb_3(AsO_4)_2$. If 20 mL of 0.1 M Pb^{2+} is required to reach the equivalence point, the mass percentage of arsenic in the pesticide sample is closest to

A. 8.1 B. 2.3

C. 5.4 D. 3.6

Question Number : 75

When treated with conc. HCl. MnO_2 yields a gas (X) which further reacts with $Ca(OH)_2$ to generate a white solid (Y). The solid Y reacts with dil. HCl to produce the same gas X. The solid Y is

A. CaO
B. $CaCl_2$
C. Ca(OCl)Cl
D. $CaCO_3$

Part-11 Biology

Question Number : 76

The atmospheric pressure is 760 mm Hg at the sea level. Which of the following ranges is nearest to the partial pressure of CO_2 in mm Hg?

A. 0.30 -- 0.31
B. 0.60 -- 0.61
C. 3.0 – 3.1
D. 6.0 – 6.1

Question Number : 77

A breeder crossed a pure bred tall plant having white flowers to a pure bred short plant having blue flowers. He obtained 202 F_1 progeny and found that they are all tall having white flowers. Upon selfing these F_1 plants. he obtained a progeny of 2160 plants. Approximately. how many of these are likely to be short and having blue flowers?

A. 1215
B. 405
C. 540
D. 135

Question Number : 78

Match the different types of heart given in column A with organisms given in the column B. Choose the correct combination.

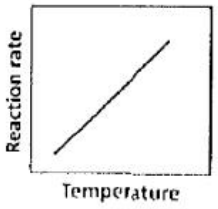
Column A	Column B
P. Neurogenic heart	i. Human
Q. Bronchial heart	ii. King crab
R. Pulmonary heart	iii. Shark

A. P-ii. Q-iii. R-i
B. P-iii. Q-ii. R-i
C. P-i. Q-iii. R-ii
D. P-ii. Q-i. R-iii

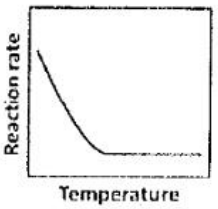
Question Number : 79

Given below are the four schematics that describe the dependence of the rate of an enzymatic reaction on temperature. Which of the following combinations is true for thermophilic and psychrophilic organisms?

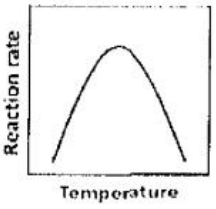
P.



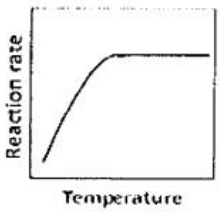
Q.



R.



S.



A. P and P
B. P and S
C. P and R
D. R and R

Question Number : 80

Match the enzymes in Group I with the reactions in Group II Select the correct combination.

Group I	Group II
P. Hydrolase	i. Inter- conversion of optical isomers
Q. Lyase	ii. Oxidation and reduction of two substrates
R. Isomerase	iii. Joining of two compounds
S. Ligase	iv. Removal of a chemical group from a substrate
	v. Transfer of a chemical group from one substrate to another

A. P-iv. Q-ii. R-iii. S-i
B. P-v. Q-iv. R-i. S-iii
C. P-iv. Q-i. R-iii. S-v
D. P-i. Q-iv. R-v. S-ii

KVPY 2016 ANSWER KEYS FOR SA

Q. No	Key	Q. No	Key	Q. No.	Key	Q. No	Key
1	**C**	21	**A**	41	**C**	61	**C**
2	**C**	22	**D**	42	**A**	62	**B**
3	**B**	23	**C**	43	**D**	63	**C**
4	**D**	24	**D**	44	**A**	64	**A**
5	**A**	25	**A**	45	**C**	65	*
6	**B**	26	**D**	46	**C**	66	**A**
7	**B**	27	**B**	47	**B**	67	**C**
8	**C**	28	**B**	48	**D**	68	**C**
9	**C**	29	**A**	49	**A**	69	**C**
10	**B**	30	**D**	50	**A**	70	**A**
11	**D**	31	**B**	51	**B**	71	**A**
12	**C**	32	**A**	52	**B**	72	**B**
13	**A**	33	**A**	53	**C**	73	**A**
14	**C**	34	**B**	54	**A**	74	**C**
15	**D**	35	**A**	55	**A**	75	**C**
16	**D**	36	**A**	56	**A**	76	**A**
17	**C**	37	**A**	57	**B**	77	**D**
18	**C**	38	**D**	58	**D**	78	**A**
19	**C**	39	**D**	59	**B**	79	**D**
20	**B**	40	**D**	60	**A**	80	**B**

*2 mark credit for all candidates