TEST PAPER
KVPY-2017

Date : 05-11-2017 **Time Allowed:** 3 Hrs. **Maximum Marks:** 100

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INSTRUCTIONS FOR MARKING ON ANSWER SHEET

1. Immediately fill the particulars on this page of the Test Booklet with Blue / Black Ball Point Pen. Use of pencil is strictly prohibited.
2. The Test Booklet consists of **80** questions.
3. There are Two parts in the question paper. The distribution of marks subjectwise in each part is as under for each correct response.

MARKING SCHEME :

PART-I

MATHEMATICS

Question No. **1 to 15** consist of **ONE (1)** mark for each correct response.

PHYSICS

Question No. **16 to 30** consist of **ONE (1)** mark for each correct response.

CHEMISTRY

Question No. **31 to 45** consist of **ONE (1)** mark for each correct response.

BIOLOGY

Question No. **46 to 60** consist of **ONE (1)** mark for each correct response.

PART-II

MATHEMATICS

Question No. **61 to 65** consist of **TWO (2)** marks for each correct response.

PHYSICS

Question No. **66 to 70** consist of **TWO (2)** marks for each correct response.

CHEMISTRY

Question No. **71 to 75** consist of **TWO (2)** marks for each correct response.

BIOLOGY

Question No. **76 to 80** consist of **TWO (2)** marks for each correct response.

4. Candidates will be awarded marks as stated above in Instructions No. 3 for correct response of each question.for Part-I **0.25** marks will be deducted for indicating incorrect response of each question and for Part-II **0.50** marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the Answer sheet.
5. No candidate is allowed to carry any textual material, printed or written, bits of papers, paper, mobile phone, any electronic device, etc., except the Admit Card inside the examination hall/room.
6. Rough work is to be done on the space provided for this purpose in the Test Booklet only. This space is given at the bottom of each page.
7. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.
8. Do not fold or make any stray marks on the Answer Sheet.

PART-I
One Mark Questions

MATHEMATICS

Choose the correct (✓) answer:

1. A quadrilateral has distinct integer side lengths. If the second-largest side has length 10, then the maximum possible length of the largest side is

(1) 25 (2) 26

(3) 27 (4) 28

2. The largest power of 2 that divides $\frac{200!}{100!}$ is

(1) 98 (2) 99

(3) 100 (4) 101

3. Let a_1, a_2, a_3, a_4 be real numbers such that $a_1^2 + a_2^2 + a_3^2 + a_4^2 = 1$. Then the smallest possible value of the expression $(a_1 - a_2)^2 + (a_2 - a_3)^2 + (a_3 - a_4)^2 + (a_4 - a_1)^2$ lies in the interval

(1) (0, 1.5) (2) (1.5, 2.5)

(3) (2.5, 3) (4) (3, 3.5)

4. Let S be the set of all ordered pairs (x, y) of positive integers satisfying the condition $x^2 - y^2 = 12345678$. Then

(1) S is an infinite set

(2) S is the empty set

(3) S has exactly one element

(4) S is a finite set and has at least two elements.

5. Let $A_1A_2A_3....A_9$ be a nine-sided regular polygon with side length 2 units. The difference between the lengths of the diagonals A_1A_5 and A_2A_4 equals

(1) $2 + \sqrt{12}$ (2) $\sqrt{12} - 2$

(3) 6 (4) 2

6. Let $a_1, a_2,....a_n$ be n nonzero real numbers, of which p are positive and remaining are negative. The number of ordered pairs (j, k), j < k, for which ajak is positive, is 55. Similarly, the number of ordered pairs (j, k), j < k, for which a_ja_k is negative is 50. Then the value of $p^2 + (n - p)^2$ is

(1) 629 (2) 325

(3) 125 (4) 221

7. If a, b, c, d are four distinct numbers chosen from the set {1,2,3 ....,9}, then the minimum value of $\frac{a}{b} + \frac{c}{d}$ is

(1) $\frac{3}{8}$ (2) $\frac{1}{3}$

(3) $\frac{13}{36}$ (4) $\frac{25}{72}$

8. If $72^x . 48^y = 6^{xy}$, where x and y are nonzero rational numbers, then x + y equals

(1) 3 (2) $\frac{10}{3}$

(3) –3 (4) $-\frac{10}{3}$

9. Let AB be a line segment of length 2. Construct a semicircle S with AB as diameter. Let C be the midpoint of the arc AB. Construct another semicircle T external to the triangle ABC with chord AC as diameter. The area of the region inside the semicircle T but outside S is

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

(3) $\frac{\pi}{\sqrt{2}}$ (4) $\frac{1}{\sqrt{2}}$

Space For Rough Work

10. Let r(x) be the remainder when the polynomial $x^{135} + x^{125} - x^{115} + x^5 + 1$ is divided by $x^3 - x$. Then

(1) r(x) is the zero polynomial

(2) r(x) is a nonzero constant

(3) degree of r(x) is one

(4) degree of r(x) is two

11. It is given that the number 43361 can be written as a product of two distinct prime numbers p_1 , p_2 . Further, assume that there are 42900 numbers which are less than 43361 and are co-prime to it. Then, $p_1 + p_2$ is

(1) 462 (2) 464

(3) 400 (4) 402

12. Let ABC be a triangle with $\angle C = 90°$. Draw CD perpendicular to AB. Choose points M and N on sides AC and BC respectively such that DM is parallel to BC and DN is parallel to AC. If DM = 5, DN = 4, then AC and BC are respectively equal to

(1) $\frac{41}{4}, \frac{41}{5}$ (2) $\frac{39}{4}, \frac{39}{5}$

(3) $\frac{38}{4}, \frac{38}{5}$ (4) $\frac{37}{4}, \frac{37}{5}$

13. Let A, G and H be the arithmetic mean, geometric mean and harmonic mean, respetively of two distinct positive real numbers. If α is the smallest of the two roots of the equation $A(G - H)x^2 + G(H - A)x + H(A - G) = 0$, then

(1) $-2 < \alpha < -1$ (2) $0 < \alpha < 1$

(3) $-1 < \alpha < 0$ (4) $1 < \alpha < 2$

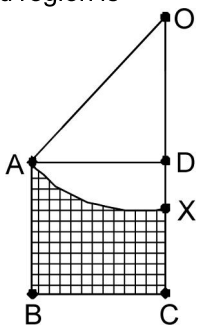
14. In the figure, ABCD is a unit square. A circle is drawn with centre O on the extended line CD and passing through A. If the diagonal AC is tangent to the circle, then the area of the shaded region is

(1) $\frac{9-\pi}{6}$

(2) $\frac{8-\pi}{6}$

(3) $\frac{7-\pi}{4}$

(4) $\frac{6-\pi}{4}$



15. The sum of all non-integer roots of the equation $x^5 - 6x^4 + 11x^3 - 5x^2 - 3x + 2 = 0$ is

(1) 6 (2) –11

(3) –5 (4) 3

PHYSICS

16. Consider the following statements (X and Y stand for two different elements)

(I) $_{32}X^{65}$ and $_{33}Y^{65}$ are isotopes.

(II) $_{42}X^{86}$ and $_{42}Y^{85}$ are isotopes.

(III) $_{85}X^{174}$ and $_{88}Y^{177}$ have the same number of neutrons.

(IV) $_{92}X^{235}$ and $_{94}Y^{235}$ are isobars

The correct statements are:

(1) II and IV only. (2) I, II and IV only.

(3) II, III and IV only. (4) I, II, III and IV.

17. A student performs an experiment to determine the acceleration due to gravity g. The student throws a steel ball up with initial velocity u and measures the height h travelled by it at different times t. The graph the student should plot on a graph paper to readily obtain the value of g is

(1) h versus t.

(2) h versus t^2.

(3) h versus $\sqrt{t}$.

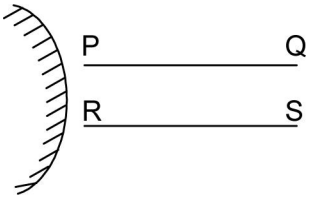
(4) h/t versus t

18. A person goes from point P to point Q covering 1/3 of the distance with speed 10 km/hr, the next 1/3 of the distance at 20 km/hr and the last 1/3 of the distance at 60 km/hr. The average speed of the person is

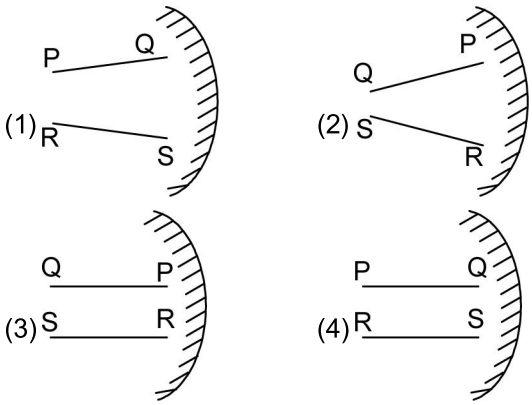
(1) 30 km/hr (2) 24 km/hr

(3) 18 km/hr (4) 12 km/hr

19. A person looks at the image of two parallel finite length lines PQ and RS in a convex mirror (see figure).



Which of the following represents schematically the image correctly? (Note: Letters P, Q, R and S are used only to denote the endpoints of the lines.)



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

20. In Guericke's experiment to show the effect of atmospheric pressure, two copper hemispheres were tightly fitted to each other to form a hollow sphere and the air from the sphere was pumped out to create vacuum inside. If the radius of each hemisphere is R and the atmospheric pressure is P, then the minimum force required (when the two hemispheres are pulled apart by the same force) to separate the hemispheres is

(1) $2\pi R^2P$ (2) $4\pi R^2P$

(3) πR^2P (4) $\pi R^2P/2$

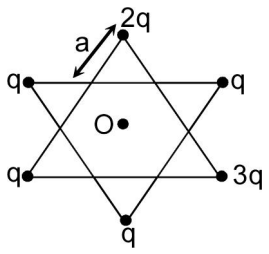
21. Positive point charges are placed at the vertices of a star shape as shown in the figure. Direction of the electrostatic force on a negative point charge at the centre O of the star is

(1) towards right

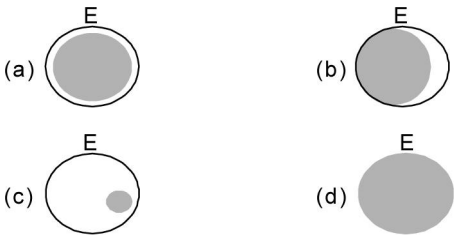
(2) vertically up

(3) towards left

(4) vertically down



22. A total solar eclipse is observed from the earth. At the same an observer on the moon views the earth. She is most likely to see (E denotes the earth)



(1) a (2) b

(3) c (4) d

23. Ice in a freezer is at –7°C. 100 g of this ice is mixed with 200 g of water at 15°C. Take the freezing temperature of water to be 0°C, the specific heat of ice equal to 2.2 J/g °C, specific heat of water equal to 4.2 J/g °C, and the latent heat of ice equal to 335 J/g. Assuming no loss of heat to the environment, the mass of ice in the final mixture is closest to

(1) 88 g

(2) 67 g

(3) 54 g

(4) 45 g

24. A point source of light is placed at $2f$ from a converging lens of focal length f. A flat mirror is placed on the other side of the lens at a distanc d such that rays reflected from the mirror are parallel after passing through the lens again. If f = 30 cm, then d is equal to

(1) 15 cm.

(2) 30 cm.

(3) 45 cm.

(4) 75 cm.

25. The word ''KVPY" is written on a board and viewed through different lense such that board is at a distance beyond the focal length of the lens.

Ignorging magnification effects, consider the following statements

(I) Image (i) has been viewed from the planar side of a plano-convex lens and image (ii) from the convex side of a plano-convex lens.

(II) Image (i) has been viewed from the concave side of a plano-concave lens and image (ii) from the planar side of a plano-convex lens.

(iii Image (i) has been viewed from the cocave side of a plano-concave lens and image (ii) from the planar side of a plano-convex lens.

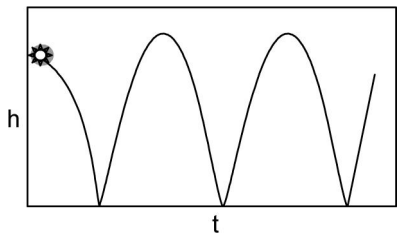
(iv) Image (i) has been viewed from the planar side of a plano-concave lens and image (ii) from the convex side of a plano-convex lens.

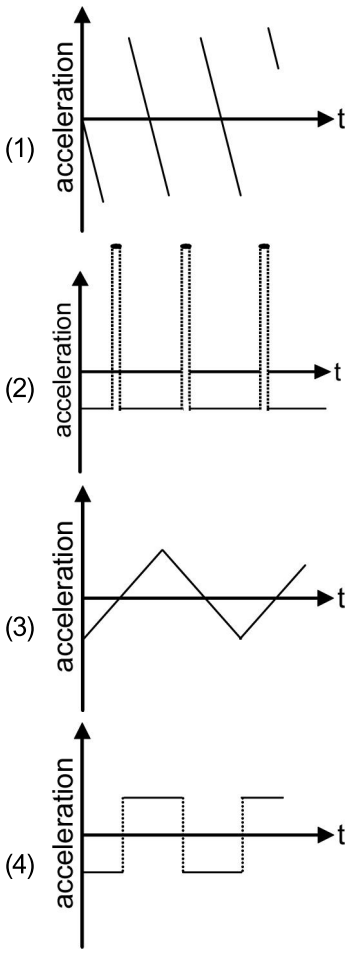
Which of the above statements are correct ?

(1) All four. (2) Only (III).

(3) Only (IV). (4) Only (II), (III) and (IV).

26. A ball is dropped vertically from heigth h and is bouncing elastically on the floor (see figure). Which of the following plots best depicts the acceleration of the ball as a function of time.





27. A student studying the similarities and differences between a camera and the human eye makes the following observations.

(I) Both the eye and the camera have convex lenses.

(II) In order to focus, the eye lens expands or contracts while the camera lens moves forward or backward.

(III) The camera lens produces upside down real images while the eye lens produces only upright real image.

(IV) A screen in camera is equivalent to the retina in the eyes.

(V) A camera ajusts the amount of light entering in it by adjusting the apeture of the lens. In the eye the cornea controls the amount of light.

The correct statemetns are :

(1) Only (I), (II) (IV). (2) Only (I), (III), (V).

(3) Only (I), (II), (IV), (V). (4) All

Space For Rough Work

28. A particle starts moving along a line from zero initial velocity and comes to rest after moving distance d. During its motion it had a constant acceleration f over 2/3 of the distance, and covered the rest of the distance with constant retardation. The time taken to cover the distance is

(1) $\sqrt{2d/3f}$ (2) $\sqrt{d/3f}$

(3) $\sqrt{3d/f}$ (4) $\sqrt{3d/2f}$

29. If the image formed by a thin convex lens of power P has agnification m then image distance v is

(1) $v = \frac{1-m}{P}$ (2) $v = \frac{1+m}{P}$

(3) $v = \frac{m}{P}$ (4) $v = \frac{1+2m}{P}$

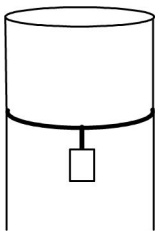
30. A long cylindrical pipe of radius 20 cm is closed at its upper end and has an airtight piston of negligible mass as shown. When a 50 Kg mass is attached to the other end of the pistion, it moves down. If the air in the enclosure is cooled from temperature T to T – ΔT, the piston moves back to its original position. Then $\Delta T/T$ is close to (Assuming air to be an ideal gas, g = 10 m/s^2, atmospheric pressure is 10^5 Pascal),

(1) 0.01

(2) 0.02

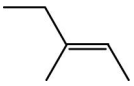
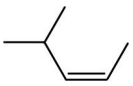
(3) 0.04

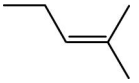
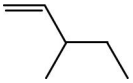
(4) 0.09



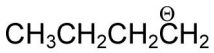
CHEMISTRY

31. The structure of 3-methylpent-2-ene is

(1)  (2) 

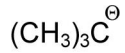
(3)  (4) 

32. The stability of carbanions

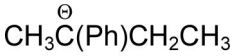


I

II



III



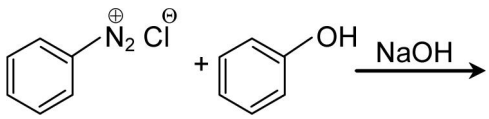
IV

follows the order

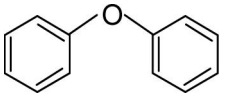
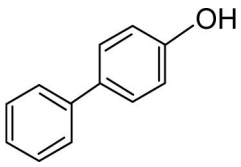
(1) III < IV < I < II (2) I < II < IV < III

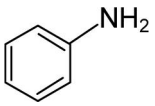
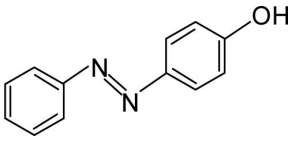
(3) III < II < I < IV (4) IV < III < II <I

33. In the following reaction

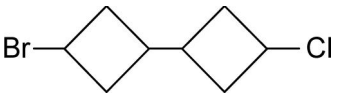


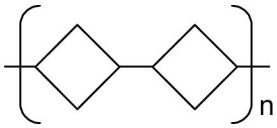
the major product is

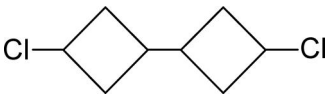
(1)  (2) 

(3)  (4) 

34. In the reaction of 1-bromo-3-Chlorocyclobutane with two equivalents of sodium in ether, the major product is

(1) 

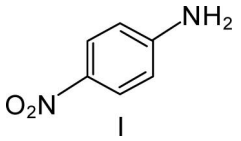
(2) 

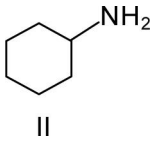
(3) 

(4) 

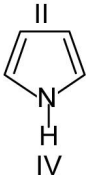
Space For Rough Work

35. The order of basicity of


I


II


III


IV

in water is

(1) IV < III < I < II (2) II < I < IV < III

(3) IV < I < III < II (4) II < III < I < IV

36. The first ionisation energy of Na, B, N and O atoms follows the order

(1) B < Na < O < N (2) Na < B < O < N

(3) Na < O < B < N (4) O < Na < N < B

37. Among P_2O_5, As_2O_3, Sb_2O_3 and Bi_2O_3 the most acidic oxide is

(1) P_2O_5 (2) As_2O_3

(3) Sb_2O_3 (4) Bi_2O_3

38. Among K, Mg, Au and Cu, the one which is extracted by heating its ore in air is

(1) K (2) Mg

(3) Au (4) Cu

39. The metal ion with total number of electrons same as S^{2-} is

(1) Na^+ (2) Ca^{2+}

(3) Mg^{2+} (4) Sr^{2+}

40. X g of Ca [atomic mass = 40] dissolves completely in concentrated HCl solution to produce 5.04 L of H_2 gas at STP. The value of X is closest to

(1) 4.5 (2) 8.1

(3) 9.0 (4) 16.2

41. A 20 g object is moving with velocity 100 ms^{-1}. The de Broglie wavelength (in m) of the object is [Planck's constant h = 6.626×10^{-34} J s]

(1) 3.313×10^{-34} (2) 6.626×10^{-34}

(3) 3.313×10^{-31} (4) 6.626×10^{-31}

42. In a closed vessel at STP, 50 L of CH_4 is ignited with 750 L of air (containing 20% O_2). The number of moles of O_2 remaining in the vessel on cooling to room temperature is closest to

(1) 5.8 (2) 2.2

(3) 4.5 (4) 6.7

43. CO_2 is passed through lime water. Initially the solution turns milky and then becomes clear upon continued boubbling of CO_2. The clear solution is due to the formation of

(1) $CaCO_3$ (2) CaO

(3) $Ca(OH)_2$ (4) $Ca(HCO_3)_2$

44. The maximum number of electrons that can be filled in the shell with the principal quantum number n = 3 is

(1) 18 (2) 9

(3) 8 (4) 2

45. The atomic radii of Li, F, Na and Si follow the order.

(1) Si > Li > Na > F (2) Li > F > Si > Na

(3) Na > Si > F > Li (4) Na > Li > Si > F

BIOLOGY

46. The major excretory product of birds is

(1) urea (2) uric acid

(3) nitrates (4) ammonia

47. Codon degeneracy means that

(1) several of the amino acids are coded by more than one codon

(2) one codon can code for many amino acids

(3) one amino acid can be coded by only one codon

(4) The codons are triplet nucleotide sequences

48. In cell cyle, during interphase,

(1) two daughter cells are produced

(2) the nucleus is divided into two daughter nuclei

(3) the chromosome condenses

(4) the DNA is replicated

49. Transfer of genetic material between populations is best defined as

(1) gene flow (2) genetic drift

(3) genetic shift (4) speciation

50. Which ONE of the following statements is CORRECT about the tobacco mosaic virus ?

(1) It affects all monocotyledonous plants

(2) It affects photosynthetic tissue of the infected plant

(3) It does not infect other species beloging to the Solanaceae

(4) It infects gymnosperms

51. Which ONE of the following statements is CORRECT about placenta ?

(1) Placenta is permeable to all bacteria

(2) Oxygen and carbon dioxide cannot diffuse through the placenta

(3) Waste products diffuse out of placenta into maternal blood

(4) Placenta does not secrete chorionic gonadotropins

52. The respiratory quotient of the reaction given below is

$2(C_{51}H_{98}O_6) + 145\ O_2 \longrightarrow 102\ CO_2 + 90\ H_2O$ + energy

(1) 0.703 (2) 0.725

(3) 0.960 (4) 1.422

53. Which ONE of the following statements is INCORRECT about nucleosomes ?

(1) They contain DNA

(2) They contain histones

(3) They are membrane-bound organelle

(4) They are a part of chromosomes

54. The immediate precursor of thyroxine is

(1) tyrosine (2) tryptophan

(3) pyridoxine (4) thymidine

55. The maximum number of oxygen molecules that can bind to one molecule of hemoglobin is

(1) 8 (2) 6

(3) 4 (4) 2

56. Which ONE of the following biomolecules is synthesized in smooth endoplasmic reticulum ?

(1) Proteins (2) Lipids

(3) Carbohydrates (4) Nucleotides

57. The products of light reaction during photosynthesis include

(1) ATP and NADPH (2) O_2 and $NADP^+$

(3) O_2 and H_2O (4) $NADP^+$ and H_2O

58. Hypothalamus directly controls the production of which of the following hormones ?

(1) glucocorticoid and insulin

(2) insulin and glucagon

(3) atrial natriuretic factor and gastrin

(4) glucocorticoids and androgens

59. Which ONE of the following drugs is NOT obtained from fungal or plant sources ?

(1) Penicillin (2) Reserpine

(3) Acetaminophen (4) Quinine

60. Jean-Baptiste Lamarck explained evolution based on

(1) natural selection

(2) survival of the fittest

(3) mutations

(4) inheritance of acquired characteristics

Space For Rough Work

PART-II
Two Mark Questions

MATHEMATICS

61. Let S be the circle in xy-plane which touches the x-axis at point A, the y-axis at point B and the unit circle $x^2 + y^2 = 1$ at point C externally. If O denotes the origin, then the angle OCA equals

(1) $\frac{5\pi}{8}$ (2) $\frac{\pi}{2}$ (3) $\frac{3\pi}{4}$ (4) $\frac{3\pi}{5}$

62. In an isosceles trapezium, the length of one of the parallel sides, and the lengths of the non-parallel sides are all equal to 30. In order to maximize the area of the trapezium, the smallest angle should be

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{2}$

63. Let A_1, A_2, A_3 be regions in the xy-plane defined by

$A_1 = \{(x, y) : x^2 + 2y^2 \leq 1\}$,

$A_2 = \{(x, y) : |x|^3 + 2\sqrt{2}\,|y|^3 \leq 1\}$,

$A_3 = \{(x, y) : \max(|x|, \sqrt{2}\,|y|) \leq 1\}$

Then

(1) $A_1 \supset A_2 \supset A_3$ (2) $A_3 \supset A_1 \supset A_2$

(3) $A_2 \supset A_3 \supset A_2$ (4) $A_3 \supset A_2 \supset A_1$

64. Let ABCD be a square and E be a point outside ABCD such that E, A, C are collinear in that order. Suppose EB = ED = $\sqrt{130}$ and the areas of triangle EAB and square ABCD are equal. Then the area of square ABCD is

(1) 8 (2) 10

(3) $\sqrt{120}$ (4) $\sqrt{125}$

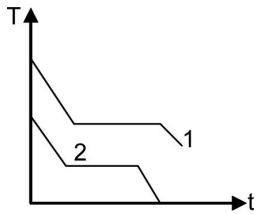
65. Consider the set A = {1, 2, 3, ..., 30}. The number of ways in which one can choose three distinct numbers from A so that the product of the chosen numbers is divisible by 9 is

(1) 1590 (2) 1505

(3) 1110 (4) 1025

PHYSICS

66. Two different liquids of same mass are kept in two identical vessels, which are placed in a freezer that extracts heat from them at the same rate causing each liquid to transform into a solid. The schematic figure below shows the temperature T vs time t plot for the two materials. We denote the specific heat in the liquid status to be C_{L1} and C_{L2} for materials 1 and 2 respectively, and latent heats of fusion U_1 and U_2 respectively.

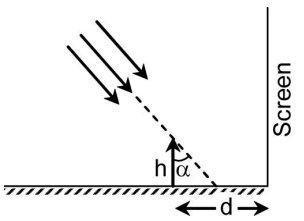


Choose the correct option.

(1) $C_{L1} > C_{L2}$ and $U_1 < U_2$ (2) $C_{L1} > C_{L2}$ and $U_1 > U_2$

(3) $C_{L1} < C_{L2}$ and $U_1 > U_2$ (4) $C_{L1} < C_{L2}$ and $U_1 < U_2$

67. A long horizontal mirror is next to a vertical screen (See figure). Parallel light rays are falling on the mirror at an angle α from the vertical. If a vertical object of height *h* is kept on the mirror at a distance d > h tan (1). The length of the shadow of the object on the screen would be

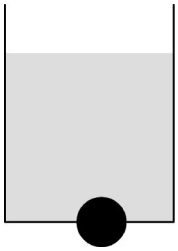


(1) h/2 (2) h tan (α)

(3) 2h (4) 4h

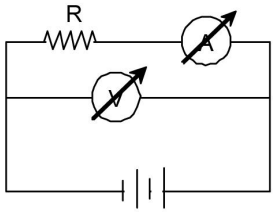
Space For Rough Work

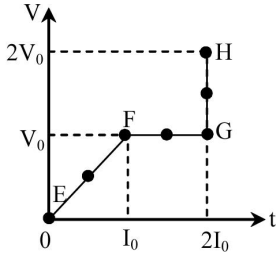
68. A spherical marble of radius 1 cm is stuck in a circular hole of radius slightly smaller than its own radius (for calculation purpose, both can be taken same) at the bottom of a bucket of height 40 cm and filled with water up to 10 cm. If the mass of the marble is 20 g, the net force on the marble due to water is close to



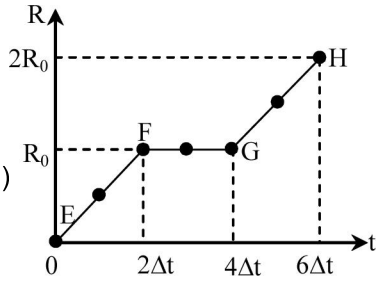
(1) 0.02 N upward (2) 0.02 N downward
(3) 0.04 N upward (4) 0.04 N downward

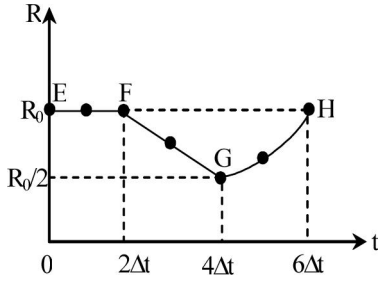
69. In the circuit shown below (on the left) the resistance and the emf source are both variable. The graph of seven readings of the voltmeter and the ammeter (V and I, respectively) for different setting of resistance and the emf, taken at equal intervals of time Δt, are shown (on the right) by the dots connected by the curve EFGH. Consider the interval resistance of the battery to be negligible and the voltmeter and ammeter to be ideal devices. Take $R_0 \equiv V_0/I_0$.

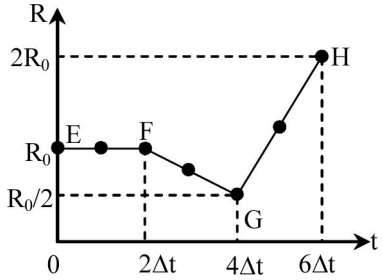


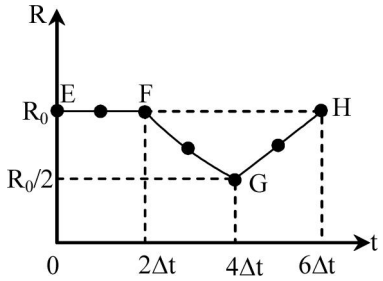


Then the plot of the resistance as a function of time corresponding to the curve EFGH is given by

(1)


(2)


(3)


(4)


70. Stoke's law states that the viscous drag force F experienced by a sphere of radius a, moving with a speed V through a fluid with coefficient of viscosity η, is given by $F = 6\pi\eta a v$. If this fluid is flowing through a cylindrical pipe of radius r, length ℓ and a pressure difference of P across its two ends, then the volume of water V which flows through the pipe in time t can be written as

$\frac{V}{t} = k\left(\frac{P}{\ell}\right)^a \eta^b r^c$, where k is a dimensional constant.

Correct values of a, b and c are

(1) a = 1, b = –1, c = 4
(2) a = –1, b = 1, c = 4
(3) a = 2, b = –1, c = 3
(4) a = 1, b = –2, c = –4

Space For Rough Work

CHEMISTRY

71. The reaction of an alkene X with bromine produce a compound Y, which has 22.22% C, 3.71% H and 74.07% Br. The ozonolysis of alkene X gives only one product. The alkene X is :

[Given : atomic mass of c = 12 ; H = 1; Br = 80]

(1) ethylene (2) 1-butene

(3) 2-butene (4) 3-hexene

72. In the following reaction $H_3C - C \equiv C - H \xrightarrow[H_3O^+]{Hg^{2+}} X$

$\xrightarrow[PhCHO]{dil.NaOH}$ Y; X and Y, respectively, are

(1) X = H_3C CHO Y = H_3C CHO Ph

(2) X = H_3C C(=O) CH_3 Y = H_3C Ph

(3) X = H_3C C(=O) CH_3 Y = H_3C Ph CH_3

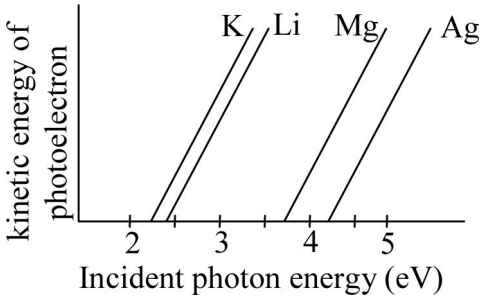
(4) X = H_3C CHO Y = H_3C Ph

73. $KMnO_4$ reacts with H_2O_2 in an acidic medium. The number of moles of oxygen produced per mole of $KMnO_4$ is

(1) 2.5 (2) 5

(3) 1.25 (4) 2

74. The photoelectric behaviour of K, Li, Mg and Ag metals is shown in the plot below. If light of wavelength 400 nm is incident on each of these metals, which of them will emit photoelectrons ?



(1) K (2) K and Li

(3) K, Li and Mg (4) K, Li, Mg and Ag

75. A piece of metal weighing 100 g is heated to 80° C and dropped into 1 kg of cold water in an insulated container at 15°C. If the final temperature of the water in the container is 15.69 °C. If the final temperature of the water in the container is 15.69 °C, the specific heat of the metal in J/g. °C is

(1) 0.38 (2) 0.24

(3) 0.45 (4) 0.13

BIOLOGY

76. The nucleus of a diploid organism contains 3 ng of DNA in G_1 phase. Which ONE of the following statements describes the state of the cell at the end of S phase ?

(1) The nucleus divides into two, and each nucleus contains 3 ng of DNA

(2) The nucleus does not divide, and it contains 3 ng of DNA

(3) The nucleus divides into two, and each nucleus contains 1.5 ng of DNA

(4) The nucleus does not divide and it contains 6 ng of DNA

77. Three cellular processes are listed below. Choose the Correct combination of processes that involve proton gradient across the membrane.

(i) Photosynthesis (ii) Aerobic respiration

(iii) Anaerobic respiration

(1) ii and iii

(2) i and ii

(3) i, ii and iii

(4) i and iii

Space For Rough Work

78. The concentration of OH^- ions in a solution with the H^+ ions concentration of 1.3×10^{-4} M is

(1) 7.7×10^{-4} M (2) 1.3×10^{-4} M

(3) 2.6×10^{-8} M (4) 7.7×10^{-11} M

79. Given that tidal volume is 600 ml, inspiratory reserve volume is 2500 ml, and expiratory reserve volume is 800 ml, what is the value of vital capacity of lung ?

(1) 3900 ml (2) 3300 ml

(3) 3100 ml (4) 1400 ml

80. Which of the following organisms produce sperm without involving meiosis ?

(1) Sand fly and fruit fly

(2) House fly and grasshopper

(3) Honeybee and ant

(4) Zebra fish and frog

Space For Rough Work

ANSWERS
KVPY-SA-05.11.2017

1.	(2)	14.	(4)	27.	(1)	40.	(3)	53.	(3)	66.	(3)	79.	(1)						
2.	(3)	15.	(4)	28.	(3)	41.	(1)	54.	(1)	67.	(3)	80.	(3)						
3.	(2)	16.	(3)	29.	(1)	42.	(2)	55.	(3)	68.	(4)								
4.	(2)	17.	(4)	30.	(3)	43.	(4)	56.	(2)	69.	(4)								
5.	(4)	18.	(3)	31.	(1)	44.	(1)	57.	(1)	70.	(1)								
6.	(3)	19.	(2)	32.	(3)	45.	(4)	58.	(4)	71.	(3)								
7.	(4)	20.	(3)	33.	(4)	46.	(2)	59.	(3)	72.	(2)								
8.	(4)	21.	(1)	34.	(4)	47.	(1)	60.	(4)	73.	(1)								
9.	(2)	22.	(2)	35.	(3)	48.	(4)	61.	(1)	74.	(2)								
10.	(3)	23.	(2)	36.	(2)	49.	(1)	62.	(3)	75.	(3)								
11.	(1)	24.	(3)	37.	(1)	50.	(2)	63.	(4)	76.	(4)								
12.	(1)	25.	(4)	38.	(4)	51.	(3)	64.	(2)	77.	(2)								
13.	(2)	26.	(2)	39.	(2)	52.	(1)	65.	(1)	78.	(4)								