HORIZON ACADEMY®

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Name.: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Date : 25/10/2015

Test No.: 1 1

Subject Code.: 1 1 1

Time : 3 Hrs. **M.M. : 360**

HORIZON TEST SERIES

for

Engineering Entrance Exam.

2016

[Test No. 11]

INSTRUCTIONS FOR STUDENTS

1. Read each question carefully.
2. It is mandatory to use Blue/Black Ball Point Pen to darken the appropriate circle in the answer sheet.
3. Mark should be dark and should complete fill the circle.
4. Rough work must be done on the Question Paper, no additional sheet will be provided for this purpose.
5. Do not use white-fluid or any other rubbing material on answer sheet. No change in the answer once marked.
6. Student cannot use log tables and calculators or any other material in the examination hall.
7. Before attempting the question paper, student should ensure that the test paper contains all pages and no page is missing.
8. Each correct answer carries four marks. One mark will be deducted for each incorrect answer from the total score.
9. Before handing over the answer sheet to the invigilator, candidate should check the particulars have been filled and marked correctly.
10. Immediately after the prescribed examination time is over, the answer sheet to be returned to the invigilator.
11. Use of Calculator and other Electronic device is not permitted.

Test No. 11

Topics of The Test

Physics	Work, Energy and Power + Centre of mass.
Chemistry	Equilibrium.
Maths	Straight lines.

Test No. II

[PHYSICS]

1. A ball is released from the top of a tower. The ratio of work done by force of gravity in first, second and third second of the motion of the ball is

(A) 1:2:3 (B) 1:4:9

(C) 1:3:5 (D) 1:5:3

2. Two springs have their force constants as k_1 and $k_2(k_1 > k_2)$, when they are stretched by the same force

(A) no work is done in case of both the springs

(B) equal work is done in case of both the springs

(C) more work is done in case of second spring

(D) more work is done in case of first spring

3. A spring of force constant 800 Nm^{-1} has an extension of 5 cm. The work done in extending it from 5 cm to 15 cm is

(A) 16 J (B) 8 J

(C) 32 J (D) 24 J

4. A uniform chain of length 2 m is kept on a table such that a length of 60 cm hangs freely from the edge of the table. The total mass of the chain is 4 kg. What is the work done in pulling the entire chain on the table?

(A) 7.2 J (B) 3.6 J

(C) 120 J (D) 1200 J

5. A particle is released from a height *h*. At a certain height, its KE is two times its potential energy. Height and speed of the particle at that instant are

(A) $\frac{h}{3}, \sqrt{\frac{2gh}{3}}$ (B) $\frac{h}{3}, 2\sqrt{\frac{gh}{3}}$

(C) $\frac{2h}{3}, \sqrt{\frac{2gh}{3}}$ (D) $\frac{h}{3}, \sqrt{2gh}$

6. A ball of mass 2 kg and another of mass 4 kg are dropped together from a 60 ft tall building. After a fall of 30 ft each towards earth, their respective kinetic energies will be in the ratio of

(A) $\sqrt{2}:1$ (B) 1:4

(C) 1:2 (D) $1:\sqrt{2}$

7. A particle is projected at 60° to the horizontal with a kinetic energy K. The kinetic energy at the highest point is

(A) K (B) zero

(C) K/4 (D) K/2

8. A vertical spring with force constant *k* is fixed on a table. A ball of mass *m* at a height *h* above the free upper end of the spring falls vertically on the spring, so that the spring is compressed by a distance *d*. The net work done in the process is

(A) $mg(h+d)+\frac{1}{2}kd^2$

(B) $mg(h+d)-\frac{1}{2}kd^2$

(C) $mg(h-d)-\frac{1}{2}kd^2$

(D) $mg(h-d)+\frac{1}{2}kd^2$

9. If *F* is the force required to keep a train moving at a constant speed v, the power required is

(A) $\frac{1}{2}Fv^2$ (B) Fv^2

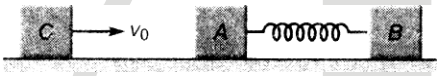
(C) $\frac{1}{2}Fv$ (D) Fv

Space for Rough Work

10. In two separate collisions, the coefficient of restitutions e_1 and e_2 are in the ratio 3:1. In the first collision the relative velocity of approach is twice the relative velocity of separation, then the ratio between relative velocity of approach and the relative velocity of separation in the second collision is

(A) 1:6 (B) 2:3
(C) 3:2 (D) 6:1

11. A block *C* of mass *m* is moving with velocity v_0 and collides elastically with block *A* of mass *m* and connected to another block *B* of mass 2*m* through spring constant *k*. What is *k* if x_0 is compression of spring when velocity of *A* and *B* is same ?



(A) $\frac{mv_0^2}{x_0^2}$ (B) $\frac{mv_0^2}{2x_0^2}$
(C) $\frac{3}{2}\frac{mv_0^2}{x_0^2}$ (D) $\frac{2}{3}\frac{mv_0^2}{x_0^2}$

12. A bomb is kept stationary at a point. It suddenly explodes into two fragments of masses 1g and 3g. The total KE of the fragments is 6.4×10^4 J. What is the KE of the smaller fragment ?

(A) 2.5×10^4J (B) 3.5×10^4J
(C) 4.8×10^4J (D) 5.2×10^4J

13. Consider elastic collision of a particle of mass *m* moving with a velocity *u* with another particle of the same mass at rest. After the collision the projectile and the struck particle move in directions making angles θ_1 and θ_2 respectively with the initial direction of motion. The sum of the angles $\theta_1 + \theta_2$ is

(A) 45° (B) 90°
(C) 135° (D) 180°

14. A body of mass *M* moves with velocity v and collides elastically with another body of mass $m(M >> m)$ at rest, then the velocity of body of mass *m* is

(A) v (B) $2v$
(C) $v/2$ (D) zero

15. When U^{238} nucleus originally at rest, decays by emitting an alpha particle having a speed *u*, the recoil speed of the residual nucleus is

(A) $\frac{4u}{238}$ (B) $-\frac{4u}{234}$
(C) $\frac{4u}{234}$ (D) $-\frac{4u}{238}$

16. An α-particle of mass *m* suffers one dimensional elastic collision with a nucleus of unknown mass. After the collision the α-particle is scattered directly backward losing 75% of its kinetic energy. Then the mass of the nucleus is

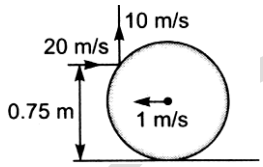
(A) m (B) $2m$
(C) $3m$ (D) $\frac{3}{2}m$

17. An elastic ball is dropped from a height *h* and it rebounds many times from the floor. If the coefficient of restitution is *e*, the time interval between the second and the third impact, is

(A) ev/g (B) e^2v/g
(C) $e^2\sqrt{\left(\frac{8h}{g}\right)}$ (D) $e^2\sqrt{\left(\frac{h}{g}\right)}$

Space for Rough Work

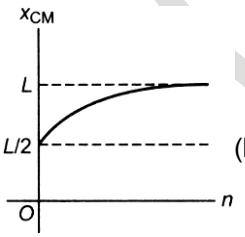
18. A thin ring of mass 2 kg and radius 0.5 m is rolling without slipping on a horizontal plane with velocity 1 m/s. A small ball of mass 0.1 kg, moving with velocity 20 m/s in the opposite direction, hits the ring at a height of 0.75 m and goes vertically up with velocity 10 m/s. Immediately after the collision

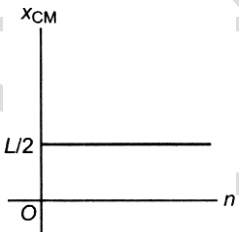


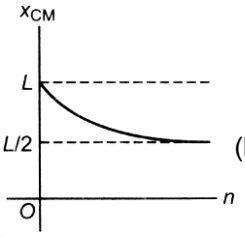
(A) the ring has pure rotation about its stationary CM
(B) the ring comes to a complete stop
(C) the ring has pure translational motion
(D) there is no friction between the ring and the ground

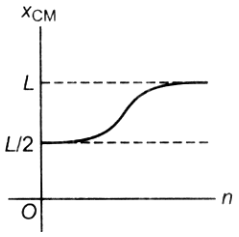
19. A system consists of 3 particles each of mass m located at points (1,1), (2,2) and (3,3). The coordinates of the centre of mass are
(A) (6,6) (B) (3,3)
(C) (1,1) (D) (2,2)

20. A thin rod of length L is lying along the x-axis with its ends at x = 0 and x = L. Its linear density (mass\length) varies with x as $k\left(\frac{x}{L}\right)^n$, where n can be zero or any positive number. If the position x_{CM} of the centre of mass of the rod is plotted against n, which of the following graphs best approximates the dependence of x_{CM} on n ?

(A) 

(B) 

(C) 

(D) 

21. Two particles A and B initially at rest, move towards each other, under mutual force of attraction. At an instance when the speed of A is v and speed of B is $2v$, the speed of centre of mass (CM) is
(A) zero (B) v
(C) $2.5v$ (D) $4v$

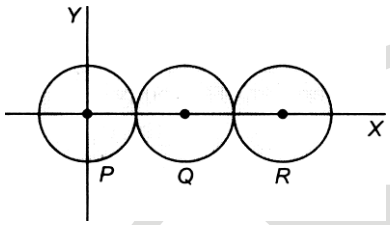
22. Four point masses P, Q, R and S with respective masses 1 kg, 1kg, 2kg and 2 kg situated on the corners of a square of side a. The centre of mass of the system will be farthest from
(A) P only (B) R and S
(C) R only (D) P and Q

23. Consider a two particle system with particles having masses m_1 and m_2. If the first particles is pushed towards the centre of mass through a distance d, by what distance should the second particle be moved, so as to keep the centre of mass at the same position?
(A) $\frac{m_2}{m_1}d$ (B) $\frac{m_1}{m_1+m_2}d$
(C) $\frac{m_1}{m_2}d$ (D) d

24. A body A of mass M while falling vertically downwards under gravity breaks into two parts ; a body B of mass $\frac{1}{3}M$ and a body C of mass $\frac{2}{3}M$. The centre of mass of bodies B and C taken together shifts compared to that of body A towards
(A) depends on height of breaking
(B) does not shift
(C) body C
(D) body B

Space for Rough Work

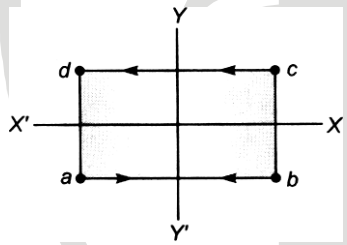
25. Three identical spheres, each of mass 1 kg are kept as shown in figure below, touching each other, with their centres on a straight line. If their centres are marked P, Q, R respectively, the distance of centre of mass of the system from P is



(A) $\frac{PQ+PR+QR}{3}$ (B) $\frac{PQ+PR}{3}$

(C) $\frac{PQ+QR}{3}$ (D) $\frac{PR+QR}{3}$

26. Four bodies of equal mass start moving with same speed are shown in the figure. In which of the following combination the centre of mass will remain at origin?



(A) cd (B) ab

(C) ac (D) bd

27. If linear mass density of a rod of length 3 m varies as $\lambda = 2 + x$, then the position of the centre of mass of the rod is

(A) $\frac{7}{3}$m (B) $\frac{12}{7}$m

(C) $\frac{10}{7}$m (D) $\frac{9}{7}$m

28. Two particles of equal mass have velocities $\mathbf{v}_1 = 4\hat{\mathbf{i}}$ and $\mathbf{v}_2 = 4\hat{\mathbf{j}}\ \text{ms}^{-1}$. First particle has an acceleration $\mathbf{a}_1 = (5\hat{\mathbf{i}} + 5\hat{\mathbf{j}})\ \text{ms}^{-2}$, while the acceleration of the other particle is zero. The centre of mass of the two particles moves in a path of

(A) straight line (B) parabola

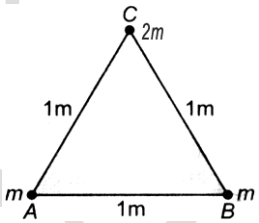
(C) circle (D) ellipse

29. The ratio of moments of inertia of circular ring and a circular disc having the same mass and radii about an axis passing through the centre and perpendicular to its plane is

(A) 1:1 (B) 2:1

(C) 1:2 (D) 4:1

30. Two balls each of mass m are placed on the vertices A and B of an equilateral triangle ABC of side 1m. A ball of mass $2m$ is placed at vertex C. The centre of mass of this system from vertex A (located at origin) is



(A) $\left(\frac{1}{2}\text{m}, \frac{1}{2}\text{m}\right)$ (B) $\left(\frac{1}{2}\text{m}, \sqrt{3}\,\text{m}\right)$

(C) $\left(\frac{1}{2}\text{m}, \frac{\sqrt{3}}{4}\text{m}\right)$ (D) $\left(\frac{\sqrt{3}}{4}\text{m}, \frac{\sqrt{3}}{4}\text{m}\right)$

Space for Rough Work

[CHEMISTRY]

31. Consider the following gaseous equilibria with equilibrium constants K_1 and K_2 respectively.

$$SO_2(g)+\frac{1}{2}O_2(g)\rightleftharpoons SO_3(g)$$

$$2SO_3(g)\rightleftharpoons 2SO_2(g)+O_2(g)$$

The equilibrium constants are related as

(A) $2K_1=K_2^2$ (B) $K_1^2=\frac{1}{K_2}$

(C) $K_2^2=\frac{1}{K_1}$ (D) $K_2=\frac{2}{K_1^2}$

32. $2HI(g)\rightleftharpoons H_2(g)+I_2(g)$

The equilibrium constant of the above reaction is 6.4 at 300 K. If 0.25 mole each of H_2 and I_2 are added to the system, the equilibrium constant will be

(A) 6.4 (B) 0.8

(C) 3.2 (D) 1.6

33. The equilibrium constants K_{p_1} and K_{p_2} for the reactions $X\rightleftharpoons 2Y$ and $Z\rightleftharpoons P+Q$, respectively are in the ratio of 1:9. If the degree of dissociation of X and Z be equal, then the ratio of total pressure at these equilibria is

(A) 1:36 (B) 1:1

(C) 1:3 (D) 1:9

34. The equilibrium constant (K_p) for the decomposition of gaseous H_2O

$$H_2O(g)\rightleftharpoons H_2(g)+\frac{1}{2}O_2(g)$$

is related to degree of dissociation (α) at a total pressure p is given by

(A) $K_p=\frac{\alpha^3 p^{1/2}}{(1+\alpha)(2+\alpha)^{1/2}}$

(B) $K_p=\frac{\alpha^3 p^{3/2}}{(1-\alpha)(2+\alpha)^{1/2}}$

(C) $K_p=\frac{\alpha^{3/2} p^2}{(1-\alpha)(2+\alpha)^{1/2}}$

(D) $K_p=\frac{\alpha^{3/2} p^{1/2}}{(1-\alpha)(2+\alpha)^{1/2}}$

35. In the reaction, $3A+2B\longrightarrow 2C$, the equilibrium constant K_c is given by

(A) $\frac{[3A]\times[2B]}{[C]}$ (B) $\frac{[A]^3\times[B]}{[C]}$

(C) $\frac{[C]^2}{[A]^3\times[B]^2}$ (D) $\frac{[C]}{[3A][2B]}$

36. 56 g of nitrogen and 8 g of hydrogen gas are heated in a closed vessel. At equilibrium 34 g of ammonia are present. The equilibrium number of moles of nitrogen, hydrogen and ammonia are respectively

(A) 1,2,2 (B) 2,2,1

(C) 1,1,2 (D) 2,1,2

37. Partial pressure of O_2 in the reaction $2Ag_2O(s)\rightleftharpoons 4Ag(s)+O_2(g)$ is

(A) K_p (B) $\sqrt{K_p}$

(C) $3\sqrt{K_p}$ (D) $2K_p$

38. The equilibrium constant for the reaction,

$$N_2(g)+O_2(g)\rightleftharpoons 2NO(g)$$

at temperature T is 4×10^{-4}. The value of K_c for the reaction

$$NO(g)\rightleftharpoons\frac{1}{2}N_2(g)+\frac{1}{2}O_2(g)$$

at the same temperature is

(A) 2.5×10^2 (B) 50

(C) 4×10^{-4} (D) 0.02

Space for Rough Work

39. For the reaction, $C_2H_4 + H_2 \rightleftharpoons C_2H_6$ the correct relation is

(A) $K_p = K_c$ (B) $K_p = K_c[RT]$

(C) $K_p = K_c[RT]^{-2}$ (D) $K_p = K_c[RT]^{-1}$

40. For which of the following reactions, $K_p = K_c$?

(A) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

(B) $N_2 + O_2 \rightleftharpoons 2NO$

(C) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

(D) $2SO_3 \rightleftharpoons 2SO_2 + O_2$

41. Given the equilibrium system

$$NH_4Cl(s) \rightleftharpoons NH_4^+(aq) + Cl^-(aq)$$

($\Delta H = +3.5$ kcal/mol).

What change will shift the equilibrium to the right ?

(A) Decreasing the temperature

(B) Increasing the temperature

(C) Dissolving NaCl crystals in the equilibrium mixture

(D) Dissolving NH_4NO_3 crystals in the equilibrium mixture

42. In a lime kiln, to get higher yield of CO_2, the measure that can be taken is

(A) to remove CaO

(B) to add more $CaCO_3$

(C) to maintain high temperature

(D) to pump out CO_2

43. What is the best description of the change that occurs when $Na_2O(s)$ is dissolved in water ?

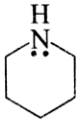
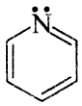
(A) Oxidation number of sodium decreases

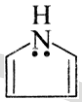
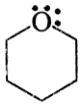
(B) Oxide ion accepts sharing in a pair of electrons

(C) Oxide ion donates a pair of electrons

(D) Oxidation number of oxygen increases

44. The strongest base is

(A)  (B) 

(C)  (D) 

45. Four species are listed below

(i) HCO_3^- (ii) H_3O^+

(iii) HSO_4^- (iv) HSO_3F

Which one of the following is the correct sequence of their acid strength ?

(A) (iv) < (ii) < (iii) < (i)

(B) (ii) < (iii) < (i) < (iv)

(C) (i) < (iii) < (ii) < (iv)

(D) (iii) < (i) < (iv) < (ii)

46. The first and second dissociation constants of an acid H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The overall dissociation constant of the acid will be

(A) 5.0×10^{-5} (B) 5.0×10^{15}

(C) 5.0×10^{-15} (D) 0.2×10^{5}

47. Arrange NH_4^+, H_2O, H_3O^+, HF and OH^- in increasing order of acidic nature

(A) $H_3O^+ < NH_4^+ < HF < OH^- < H_2O$

(B) $NH_4^+ < HF < H_3O^+ < H_2O < OH^-$

(C) $OH^- < H_2O < NH_4^+ < HF < H_3O^+$

(D) $H_3O^+ > HF > H_2O > NH_4^+ > OH^-$

48. The species among the following, which can act as an acid and a base is

(A) HSO_4^- (B) SO_4^{2-}

(C) H_3O^+ (D) Cl^-

Space for Rough Work

49. The values of dissociation constant of bases are given below. Which is the weakest base ?

(A) 1.8×10^{-5} (B) 4.8×10^{-10}

(C) 7.2×10^{-11} (D) 7.07×10^{-7}

50. The strongest conjugate base is

(A) NO_3^- (B) Cl^-

(C) SO_4^{2-} (D) CH_3COO^-

51. The pH of 10^{-10} M NaOH solution is nearest to

(A) – 4 (B) –10

(C) 4 (D) 7

52. 10^{-6} M NaOH is diluted 100 times. The pH of the diluted base is

(A) between 7 and 8 (B) between 5 and 6

(C) between 6 and 7 (D) between 10 and 11

53. 100 mL of 0.015 M HCl solution is mixed with 100 mL of 0.005 M HCl. What is the pH of the resultant solution?

(A) 2.5 (B) 1.5

(C) 2 (D) 1

54. At 25°C, the solubility product of $Mg(OH)_2$ is 1.0×10^{-11}. At which pH, will Mg^2 ions start precipitating in the form of $Mg(OH)_2$ from a solution of 0.001 M Mg^2 ions ?

(A) 9 (B) 10

(C) 11 (D) 8

55. Approximate relationship between dissociation constant of water (K) and ionic product of water (K_w) is

(A) $K_w = K$ (B) $K_w = 55.6\times K$

(C) $K_w = 18\times K$ (D) $K_w = 14\times K$

56. The pH of an aqueous solution of CH_3COONa of concentration $C(M)$ is given by

(A) $7-\frac{1}{2}pK_a-\frac{1}{2}\log C$

(B) $\frac{1}{2}pK_w+\frac{1}{2}pK_b+\frac{1}{2}\log C$

(C) $\frac{1}{2}pK_w-\frac{1}{2}pK_b-\frac{1}{2}\log C$

(D) $\frac{1}{2}pK_w+\frac{1}{2}pK_a+\frac{1}{2}\log C$

57. The pK_a of a weak acid, H*A*, is 4.80. The pK_b of a weak base, BOH is 4.78. The pH of an aqueous solution of the corresponding salt, *BA*, will be

(A) 9.58 (B) 4.79

(C) 7.01 (D) 9.22

58. The hydrolysis of sodium carbonate involves the reaction between

(A) sodium ion and water

(B) Na^+ and OH^-

(C) CO_3^{2-} and water

(D) CO_3^{2-} and H^+

59. 0.1 mole of $CH_3NH_2(K_b = 5\times10^{-4})$ is mixed with 0.08 mole of HCl and diluted to 1 L. What will be the H^+ concentration in the solution ?

(A) 8×10^{-2} M (B) 8×10^{-11} M

(C) 1.6×10^{-11} M (D) 8×10^{-5} M

60. Degree of dissociation of NH_4OH in water is 1.8×10^{-5}, then hydrolysis constant of NH_4Cl is

(A) 1.8×10^{-5} (B) 1.8×10^{-10}

(C) 5.55×10^{-5} (D) 5.55×10^{-10}

Space for Rough Work

[MATHEMATICS]

61. The straight line $3x + y = 9$ divides the line segment joining the points (1,3) and (2,7) in the ratio

(A) 3:4 externally (B) 3:4 internally

(C) 4:5 internally (D) 5:6 externally

62. If the slope of one of the lines represented by $ax^2 + 2hxy + by^2 = 0$ be the square of the other, then $\frac{a+b}{h} + \frac{8h^2}{ab}$ is

(A) 3 (B) 4

(C) 5 (D) 6

63. If the lines $kx - 2y - 1 = 0$ and $6x - 4y - m = 0$ are identical (coincident) lines, then the values of k and m are

(A) $k = 3, m = 2$ (B) $k = -3, m = 2$

(C) $k = -3, m = -2$ (D) $k = 3, m = -2$

64. The perpendicular bisector of the line segment joining $P(1,4)$ and $Q(k,3)$ has y-intercept –4. Then, a possible value of k is

(A) – 4 (B) 1

(C) 2 (D) –2

65. The value of k such that the lines $2x - 3y + k = 0$, $3x - 4y - 13 = 0$ and $8x - 11y - 33 = 0$ are concurrent, is

(A) 20 (B) –7

(C) 7 (D) –20

66. The equation of perpendicular bisectors of sides AB and AC of a ΔABC are $x - y + 5 = 0$ and $x + 2y = 0$ respectively. If the coordinates of vertex A are (1,–2), then equation of BC is

(A) $14x + 23y - 40 = 0$

(B) $14x - 23y + 40 = 0$

(C) $23x + 14y - 40 = 0$

(D) $23x - 14y + 40 = 0$

67. The line passing through the point of intersection of $x + y = 2, x - y = 0$ and is parallel to $x + 2y = 5$, is

(A) $x + 2y = 1$ (B) $x + 2y = 2$

(C) $x + 2y = 4$ (D) $x + 2y = 3$

68. If the lines $3x + 4y + 1 = 0, 5x + \lambda y + 3 = 0$ and $2x + y - 1 = 0$ are concurrent, then λ is equal to

(A) – 8 (B) 8

(C) 4 (D) – 4

69. A straight line through the point $A(3,4)$ is such that its intercept between the axes is bisected at A. Its equation is

(A) $3x - 4y + 7 = 0$ (B) $4x + 3y = 24$

(C) $3x + 4y = 25$ (D) $x + y = 7$

70. The equation of the straight line passing through the point (4,3) and making intercepts on the coordinate axes whose sum is –1, is

(A) $\frac{x}{2} + \frac{y}{3} = -1$ and $\frac{x}{-2} + \frac{y}{1} = -1$

(B) $\frac{x}{2} - \frac{y}{3} = -1$ and $\frac{x}{-2} + \frac{y}{1} = -1$

(C) $\frac{x}{2} + \frac{y}{3} = 1$ and $\frac{x}{-2} + \frac{y}{1} = 1$

(D) $\frac{x}{2} - \frac{y}{3} = 1$ and $\frac{x}{-2} + \frac{y}{1} = 1$

71. The equation of pair of lines joining origin to the points of intersection of $x^2 + y^2 = 9$ and $x + y = 3$ is

(A) $x^2 + (3 - x)^2 = 9$ (B) $xy = 0$

(C) $(3 + y)^2 + y^2 = 9$ (D) $(x - y)^2 = 9$

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72. The equation of the pair of straight lines perpendicular to the pair $2x^2+3xy+2y^2+10x+5y=0$ and passing through the origin, is

(A) $2x^2+5xy+2y^2=0$

(B) $2x^2-3xy+2y^2=0$

(C) $2x^2+3xy+y^2=0$

(D) $2x^2-5xy+2y^2=0$

73. If the equation $4x^2+hxy+y^2=0$ represent coincident lines, then h is equal to

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

74. A straight line through $P(1,2)$ is such that its intercept between the axes is bisected at P. Its equation is

(A) $x+y=-1$ (B) $x+y=3$
(C) $x+2y=5$ (D) $2x+y=4$

75. If the equation $kx^2-2xy-y^2-2x+2y=0$ represents a pair of lines, then k is equal to

(A) 2 (B) –2
(C) –5 (D) 3

76. The line L given by $\frac{x}{5}+\frac{y}{b}=1$ passes through the point (13,32). The line K is parallel to L and has the equation $\frac{x}{c}+\frac{y}{3}=1$. Then, the distance between L and K is

(A) $\frac{23}{\sqrt{15}}$ (B) $\sqrt{17}$

(C) $\frac{17}{\sqrt{15}}$ (D) $\frac{23}{\sqrt{17}}$

77. The number of points on the line $x+y=4$ which are unit distance apart from the line $2x+2y=5$ is

(A) 0 (B) 1
(C) 2 (D) ∞

78. The coordinates of the foot of perpendicular from $(a,0)$ on the line $y=mx+\frac{a}{m}$ are

(A) $\left(0,\frac{a}{m}\right)$ (B) $\left(0,-\frac{a}{m}\right)$

(C) $\left(\frac{a}{m},0\right)$ (D) $\left(-\frac{a}{m},0\right)$

79. The distance between the lines $3x+4y=9$ and $6x+8y=15$ is

(A) $\frac{3}{2}$ (B) $\frac{3}{10}$
(C) 6 (D) None of these

80. If $A(2,-1)$ and $B(6,5)$ are two points, then the ratio in which the foot of the perpendicular from (4,1) to AB divides it, is

(A) 8 : 15 (B) 5 : 8
(C) –5 : 8 (D) – 8 : 5

81. The distance between the pair of parallel lines $x^2+2xy+y^2-8ax-8ay-9a^2=0$ is

(A) $2\sqrt{5}a$ (B) $\sqrt{10}a$
(C) $10a$ (D) $5\sqrt{2}a$

82. The distance between the pair of parallel lines given by $x^2-1005x+2006=0$ is

(A) 1001 (B) 1000
(C) 1005 (D) 2006

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83. If the equation of base of an equilateral triangle is $2x - y = 1$ and the vertex is (–1,2), then the length of the side of the triangle is

(A) $\sqrt{\frac{20}{3}}$ (B) $\frac{2}{\sqrt{15}}$

(C) $\sqrt{\frac{8}{15}}$ (D) $\sqrt{\frac{15}{2}}$

84. The product of the perpendicular distances from the origin on the pair of straight lines $12x^2 + 25xy + 12y^2 + 10x + 11y + 2 = 0$ is

(A) $\frac{1}{25}$ (B) $\frac{2}{25}$

(C) $\frac{3}{25}$ (D) $\frac{4}{25}$

85. Distance between the two parallel lines $y = 2x + 7$ and $y = 2x + 5$ is

(A) $\sqrt{5}/2$ (B) 2/5

(C) $2/\sqrt{5}$ (D) $1/\sqrt{5}$

86. All chords of the curve $3x^2 - y^2 - 2x + 4y = 0$ which subtend a right angle at the origin, pass through the fix point

(A) (1,2) (B) (1,–2)

(C) (–1,2) (D) (–1,–2)

87. If the lines $px^2 - qxy - y^2 = 0$ make the angle α and β with x-axis, then the value of $\tan(\alpha + \beta)$ is

(A) $\frac{-q}{1+p}$ (B) $\frac{q}{1+p}$

(C) $\frac{p}{1+q}$ (D) $\frac{-p}{1+q}$

88. A pair of perpendicular straight lines passes through the origin and also through the point of intersection of the curve $x^2 + y^2 = 4$ with $x + y = a$. The set containing the value of 'a' is

(A) {–2,2} (B) {–3,3}

(C) {–4,4} (D) {–5,5}

89. The bisector of the acute angle formed between the lines $4x - 3y + 7 = 0$ and $3x - 4y + 14 = 0$ has the equation

(A) $x + y + 3 = 0$ (B) $x - y - 3 = 0$

(C) $x - y + 3 = 0$ (D) $3x + y - 7 = 0$

90. The equation of the line bisecting perpendicularly the segment joining the points (–4,6) and (8,8) is

(A) $y = 7$ (B) $6x + y - 19 = 0$

(C) $x + 2y - 7 = 0$ (D) $6x + 2y - 19 = 0$

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