MTH103 CONTINUOUS ASSESSMENT QUESTIONS.

1. Which of the following is not a vector quantity (a) velocity (b) force (c) momentum (d) acceleration (e) none of the above.

2. Which of the following is not correct? (a) a unit vector has a magnitude of 1 (b) two or more vectors having the same initial point are coinitial vectors (c) two vectors are equal if they have same magnitude and direction (d) two or more vectors are collinear if they are perpendicular to the same line (e) a zero vector is one in which the initial and terminal points coincide.

3. If the length of the vector $a = xi + 2j - k$ is 3, find the positive value of x. (a) 2 (b) 4 (c) 5 (d) 1 (e) 7.

4. Find the values of x if the magnitude of $a = xi + (3+x)j + 2k$ is $2x+1$. (a) 3, -2 (b) 5, 6 (c) 7, 4 (d) -2, 6 (e) 0, 5.

5. Evaluate $2x^3 + x + 1$, if the magnitude of $a = 3i + xj + 2k$ is equal to the magnitude of $b = 6i + (x-4)j + 3k$. (a) 432 (b) 439 (c) 216 (d) 532 (e) 539.

6. Find the sum of the vectors $\overline{AB} + \overline{BC} - \overline{DC} - \overline{AD}$. (a) 1 (b) $\overline{AB}$ (c) $\overline{BA}$ (d) 0 (e) none of the above.

7. If $A = 3i + 6j + 12k$ and $C = 3i - 7j + 8j$, evaluate $|2A - C|$. (a) 625 (b) 25.02 (c) 52.02 (d) 55 (e) 48.

8. If $r_1 = 4i - 3j + 2k$ and $r_2 = 3i + 5j + 4k$, evaluate $2r_1 + 4r_2$. (a) $30i + 41j - 20k$ (b) $i + 4j - 16k$ (c) $20i + 14j + 20k$ (d) $18i + 20j - 24k$ (e) $20i - 14j - 20k$.

9. If $a = 2i + 3k$, $b = 4i - 6k$ and $c = 20i - 6k$, Find the scalars λ and β if c is the resultant of λa and βb. (a) 3, 4 (b) 6, 8 (c) 4, 3 (d) 4, 8 (e) 3, 2.

10. Find the values of λ if the modulus of P is 7 where P is the resultant of $A = \lambda i + 4j - k$ and $B = i + 2j - k$. (a) 6, 5 (b) 8, 4 (c) 2, -4 (d) 0, 9 (e) 3, 2.

11. Find the value of λ if the magnitude of the vector $v = \lambda i + 6j - 2k$ is the same as the magnitude of $w = 2i - 3j + (3 + \lambda)k$. (a) 6 (b) 7 (c) 4 (d) 9 (e) 3.

12. If the unit vector of the resultant of $A = i + j$ and $B = j - xk$ is $c = \dfrac{i}{3} + \dfrac{2j}{3} - \dfrac{2k}{3}$, find the value of x. (a) 6, -5 (b) 2, -2 (c) 8, -4 (d) 5, -5 (e) 3, -3.

13. If the unit vector of the sum of $A = xi + 2j$ and $B = 2k$ is equal to the unit vector of the sum of $c = (x+1)j + k$ and $d = i + k$, find the value of x. (a) 4 (b) 1 (c) 6 (d) 4 (e) 8.

14. Find a unit vector parallel to the sum of $A = 2i + 4j - 5k$, $B = i + 2j + 2k$ and $C = 2i + 4j + 10k$. (a) $\dfrac{5i + 10j + 7k}{\sqrt{174}}$ (b) $\dfrac{i + 4j + 17k}{7}$ (c) $\dfrac{9i + 8j + 14k}{5}$ (d) $\dfrac{i - j + 7k}{2}$ (e) none of the above.

15. Evaluate $(A + B).(A - B)$, if $A = 2i - 3j + 5k$ and $B = 3i + j - 2k$. (a) 24 (b) 42 (c) 56 (d) 32 (e) 40.

16. Find the value of λ if $2i - 3j + 5k$ is orthogonal to $3i + \lambda j - 2k$. (a) 8 (b) 9 (c) 16 (d) -3/4 (e) -4/3.

17. Find the angle between the two vectors $a = i + j + k$ and $b = -i + 2j + 3k$. (a) 82° (b) 63° (c) 73° (d) 32° (e) 52°

18. Find the value of x if the cross product of $i + 2j + (x-2)k$ and $-3i + j + xk$ is $7i - 14j + 7k$. (a) 7 (b) 5 (c) 8 (d) 4 (e) 3.

19. If $a = 2i - j + 3k$, $b = 3i + 2j + k$ and $c = i + mj + 4k$ are coplanar, find the value of m.

(a) -5 (b) -4 (c) -6 (d) -8 (e) -3

20. If the scalar triple product of the vectors $a = 2i + 3j - 7k$, $b = i + 2j + (x^2 + 4)k$ and $c = 2i + 2j + 2k$ is four times the scalar triple product of the vectors $d = i + xj - 4k$, $e = i + 2j + 4k$ and $f = i + j + k$, find the values of x. (a) 4,5 (b) 2, 4 (c) 7, 3 (d) 6, 8 (e) 4, 9

21. Find the length of the straight line joining the points $A(2,1)$ and $B(5,5)$. (a) 5 (b) 8 (c) 12 (d) 14 (e) 24.

22. Find the gradient of the line joining the points $A(4,3)$ and $B(8,12)$.

(a) $\dfrac{9}{4}$ (b) $\dfrac{10}{11}$ (c) $\dfrac{6}{7}$ (d) $\dfrac{2}{3}$ (e) $\dfrac{1}{2}$.

23. Find the equation of a straight line through the point $(-2,3)$, parallel to $3x - 4y + 7 = 0$.

(a) $4y + 3x + 18 = 0$ (b) $y - 6x + 5 = 0$ (c) $4y - 3x - 18 = 0$ (d) $7y - x + 21 = 0$ (e) none.

24. Find the equation of the line joining the point $(1,2)$ to the intersection of the lines $3x + y = 7$ and $4x + 2y = 10$. (a) $y - x = 3$ (b) $y + 3x = 6$ (c) $y + 7x = 5$ (d) $y + x = 3$ (e) $y - 2x = 9$

25. Find the equation of a circle with center $(2,3)$ and radius 1. (a) $x^2 + y^2 - 4x - 6y + 12 = 0$ (b) $4x^2 + 4y^2 - 16x + 7y - 4 = 0$ (c) $8x^2 + 8y^2 - x + y + 9 = 0$ (d) $x^2 + y^2 - x + y = 0$ (e) $2x^2 + 2y^2 - 6x + 8y + 9 = 0$.

26. Find the radius and center of the circle $x^2 + y^2 + 4x - 6y + 12 = 0$.

(a) 9 and $(-2,3)$ (b) 3 and $(8,5)$ (c) 1 and $(-2,3)$ (d) 5 and $(4,3)$ (e) 2 and $(6,3)$

27. Find the length of the tangent from the point $(7,5)$ to the circle $x^2 + y^2 - 4x - 6y + 9 = 0$

(a) 7 (b) 8 (c) 12 (d) 4 (e) 5.

28. Find the equation of the tangent to the parabola $4y^2 = 64x$ at the point $(3,5)$.

(a) $5y = 8x + 24$ (b) $7y = 9x + 3$ (c) $8y = 3x - 9$ (d) $5y = -8x + 24$ (e) $y = x + 24$

29. Find the equation of a hyperbola with foci $(9,0)$ and directrix $(4, 0)$.

(a) $\dfrac{x^2}{36} - \dfrac{y^2}{45} = 1$ (b) $\dfrac{x^2}{49} - \dfrac{y^2}{54} = 1$ (c) $\dfrac{x^2}{12} - \dfrac{y^2}{24} = 1$ (d) $\dfrac{x^2}{8} - \dfrac{y^2}{16} = 1$ (e) $\dfrac{x^2}{14} - \dfrac{y^2}{19} = 1$

30. Find the values of x if the distance between $A(x,1)$ and $B(2,-3)$ is $\sqrt{41}$.

(a) $3, -3$ (b) $8, 4$ (c) $7, -7$ (d) $-3, 7$ (e) $0, 8$

31. Find the mid-point coordinates of the line joining $A(5,1)$ and $B(3,-1)$.

(a) $(6,9)$ (b) $(0,8)$ (c) $(5,4)$ (d) $(8, 4)$ (e) $(4,0)$.

32. Find the angle between the lines $3y - 4x = 2$ and $7y = x + 1$.

(a) 54^0 (b) 65^0 (c) 75^0 (d) 45^0 (e) 15^0

33. Find the equation of the straight line joining the points $(-1,-4)$ and $(4,-3)$.

(a) $5y - 5x = -19$ (b) $y - x = 28$ (c) $5y - x = -19$ (d) $8y - 7x = 25$ (e) $6y - x = 8$

34. Find the equation of a line through $(-2,-3)$ and perpendicular to the line $4x + 3y - 5 = 0$

(a) $y - 3x + 6 = 0$ (b) $4y - 3x + 6 = 0$ (c) $6y - 7x + 13 = 0$ (d) $5y + 7x = 1$ (e) $y + x = 1$

35. Which of the following does not represent a circle? (a) $x^2 + y^2 + 8x + 7y - 9 = 0$ (b) $x^2 + y^2 - 8x + 2y + 7 = 0$ (c) $8x^2 - 8y^2 - x + y - 10 = 0$ (d) $2x^2 + 2y^2 - 8 = 0$ (e) none

36. Find the equation of the line passing through the points $(2, 5)$ and $(-4, 7)$.

(a) $y = 8x - 9$ (b) $y = 2x + 1$ (c) $y = 3x - 1$ (d) $y = 9x - 8$ (e) $y = x + 1$.

37. A curve passes through the point $(-3, 5)$ and its gradient at any point is given by $6x^2 + 10x - 7$. Find the equation of the curve.
(a) $2x^3 + 5x^2 - 47x - 27$ (b) $x^3 + 5x^2 - 9x$ (c) $2x^3 + 5x^2 - 7x - 7$ (d) $x^3 - 2x - 7x$
(e) $3x^3 - 7x^2 - 7x - 67$.

38. A line L, passing through the point $(6, -13)$ is parallel to the line which passes through $(7, 4)$ and $(-3, 9)$. Find the equation of the line L. (a) $2y = -x - 20$ (b) $y = x - 10$
(c) $y = 5x - 15$ (d) $y = 12x - 4$ (e) $3y = -x - 20$.

39. Find the gradient of the curve $y = 2x^2 + 5x - 1$ at the point $x = 4$.
(a) 34 (b) 45 (c) 78 (d) 21 (e) 65

40. If the distance between $(-3, 9)$ and $(x, 3)$ is 2 times the distance between $(x, -1)$ and $(2, 3)$, find the values of x. (a) 8 (b) 6 (c) 5 (d) 7 (4).

41. A particle of mass 5kg which was initially at rest and is acted upon by a force $(7t + t^2)N$ at time t seconds. Find the velocity of the particle. (a) $\left(\dfrac{7t^2}{2} + \dfrac{t^3}{3}\right)m/s$ (b) $\left(\dfrac{7t^2}{10} + \dfrac{t^3}{15}\right)m/s$
(c) $\left(\dfrac{7t^2}{5} + \dfrac{t^3}{5}\right)m/s$ (d) $\left(\dfrac{7}{5} + \dfrac{t}{5}\right)m/s$ (e) None of the above.

42. A particle of mass 5kg which was initially at rest and is acted upon by a force $(7t + t^2)N$ at time t seconds. Find the distance covered by the particle after 3 seconds. (a) 7.65m (b) 40.5m (c) 10.2s (d) 13.5s (e) None of the above.

43. A particle of mass 10kg moves along a curve whose parametric equations are $x(t) = \ell^{-t}$, $y(t) = 2Cos5t$, and $z(t) = 2\sin 5t$, all in meters, where t is the time in seconds. Find the position vector of the particle at time t = 0 seconds. (a) $(1, -50, 0)^T m$ (b) $(10, -500, 0)^T m$ (c) $(-1, 0, 10)^T m$ (d) $(1, 2, 0)^T m$ (e) None of the above.

44. 17. Which of the following is **TRUE** about Force (**F**) in Newtons? (I) Force is the rate of change in momentum (II) Force is the same as change in momentum (III) Force is obtained by the product of mass and acceleration (IV) Force is work done divided by displacement. (a) (I), (II), (III) and (IV) (b) (I), (II) and (III) (c) (I), (III) and (IV) (d) (I), (II) and (IV) (e) None of the above.

45. Work done by a particle in Joules is obtained by the... (a) product of the Force and distance covered by the particle at time t (b) rate of change of momentum (c) impulse (d) product of mass and acceleration (e) None of the above.

46. A particle moves in a straight line such that for a short time its velocity is defined by $v = (3t^2 + 4t)m/s$ where t is in seconds. Determine the distance (s) of the particle when $t = 5$ seconds with initial value of $t = 0$ and $s = 0$. (a) $175m$ (b) $200m$ (c) $400m$ (d) $800m$ (e) None of the above

47. A particle moves on a straight line from a position $s = 5t^3 + 3t^2$ in metre at time t. Determine the acceleration of the particle at time $t = 3sec$. (a) $14ms^{-2}$ (b) $96ms^{-2}$ (c) $100ms^{-2}$ (d) $90ms^{-2}$ (e) None of the above

48. A car moves in a three-dimensional space such that for a short time its velocity is given by $v = (3t + 5t, 2t + 3t^3, t + 5t^2)ms^{-1}$ where t is the time in seconds. Determine its position in 25 seconds. (a) $\begin{pmatrix} 18 \\ 16 \\ 46/3 \end{pmatrix} m$ (b) $\begin{pmatrix} 5 \\ 0 \\ 5 \end{pmatrix} m$ (c) $\begin{pmatrix} 3 \\ 1 \\ 4 \end{pmatrix} m$ (d) $\begin{pmatrix} 18 \\ 16 \\ 46/2 \end{pmatrix} m$ (e) None of the above

49. A particle moves along 3-dimensional plane whose parametric equations are $x = 3t^2$, $y = 8t$, $z = 2t^3$ in metres where t is the time in seconds. Determine the magnitude of acceleration at $t = 2s$. (a) $612ms^{-2}$ (b) $\sqrt{874}ms^{-2}$ (c) $\sqrt{612}ms^{-2}$ (d) $\sqrt{784}ms^{-2}$ (e) None of the above

50. A particle of mass 30kg is pulled horizontally through the coordinate $x(t)=3t^2$ and $y(t)=2t^3+5t^2$ in meters. Find the Position vector at $t = 2s$.
    (a) $(12,44)^T m$ (b) $(12,36)^T m$ (c) $(180,1020)^T m$ (d) $(6,24)^T m$ (e) None of the above

51. A particle of mass 30kg is pulled horizontally through the coordinate

52. $x(t)=3t^2$ and $y(t)=2t^3+5t^2$ in meters. Find the work done if the force is inclined at an angle of 60 degrees to the horizontal line t = 2s. (a) 2160 Joules (b) 36720 Joules (c) 38880 Joules (d) 19440 Joules (e) None of the above

53. Calculate the Velocity of a particle of mass 4kg in the coordinates in 4 seconds.

54. (a) $(528,96)^T m/s$ (b) $(672,197)^T m/s$ (c) $(768,192)^T m/s$ (d) $(212,384)^T m/s$ (e) None of the above

55. Calculate the Resistance acting on a particle of mass 4kg in the coordinates

56. $x(t)=3t^4-2t^3$ and $y(t)=4t^3+5t$ in 4 seconds. (a) $(528,96)^T N$ (b) $(672,197)^T N$ (c) $(768,192)^T N$ (d) $(212,384)^T N$ (e) None of the above

57. Find the Work done by a particle of mass 25kg which ran up a stair case of vertical height in coordinate (x,y) = (2,3) in 3 seconds. ($Take\ \vec{g}=9.8\vec{e}m/s^2$). (a) 245 Joules (b) 403.33 Joules (c) 1225 Joules (d) 735 Joules (e) None of the above.

58. Calculate the Kinetic Energy of a particle of mass 10kg whose position coordinate are $x(t)=5t$ and $y(t)=3t$ in 2 seconds. (a) 45 Joules (b) 170 Joules (c) 125 Joules (d) 6.8 Joules (e) None of the above.

59. Which of the following represent the equation of motion for a body of mass, Mkg shot upward against gravity at a velocity, **U** in a medium whose air resistance is Mkv, where **k** is a constant?
    (a) $\vec{v}' = \vec{g} - k\vec{v}$ (b) $\vec{v}' = -\vec{g} - k\vec{v}$ (c) $\vec{v}' = \vec{g} + k\vec{v}$ (d) $\vec{v}' = m\vec{g} - k\vec{v}$. where $\vec{v}' = \dfrac{d\vec{v}}{dt}$.

60. A particle of mass 20kg moves along a plane whose parametric equations are $x(t)=3t^2$, $y(t)=8t$, and $z(t)=3t^3$ in meters, where t is the time in seconds. Find the velocity at t = 2s. (a) $(6,0,36)^T m/s$ (b) $(12,8,36)^T m/s$ (c) $(12,16,24)^T m/s$ (d) $(120,0,720)^T m/s$ (e) None of the above

61. Find the equation of a straight line passing through the points $P(0,3)$ and $Q(2,0)$.
    (a) $2y^2+3x-6=0$ (b) $y+3x-6=0$ (c) $2y+3x-6=0$ (d) Close to each other (e) None of the above

62. Find the equation of a straight line whose gradient is 4 units and passes through the point $P(0,3)$. (a) $y-4x-3=0$ (b) $y-4x+3=0$ (c) $y+4x-3=0$ (d) $y+x-3=0$ (e) None of the above

63. Let m_1 and m_2 be the respective gradients of two lines. If the two lines are perpendicular, then (a) $m_1m_2=-1$ (b) $m_1m_2=1$ (c) $m_1m_2=-2$ (d) $m_1m_2=2$ (e) None of the above

64. Let m_1 and m_2 be the respective gradients of two lines. If the two lines are parallel, then (a) $m_1=m_2$ (b) $m_1=-m_2$ (c) $m_1=m_2^2$ (d) $m_1m_2=2$ (e) None of the above

65. Find the distance between the points $\left(\frac{1}{2},\frac{1}{2}\right)$ and $\left(-\frac{1}{2},-\frac{1}{2}\right)$.

(a) $2\sqrt{2}$ (b) 0 (c) $\sqrt{2}$ (d) $\frac{\sqrt{2}}{2}$ (e) None of the above

66. Find the value of $\alpha^2+\beta^2$ if $\alpha+\beta=2$ and the distance between the points $(1,\alpha)$ and $(\beta,1)$ is 3 units. (a) 7 (b) 9 (c) 13 (d) 11 (e) None of the above

67. If the midpoint of the line MN is $(2,3)$ and the point M is $(-2,1)$, find the coordinate of the point N. (a) $(5,5)$ (b) $(5,6)$ (c) $(6,6)$ (d) $(6,5)$ (e) None of the above

68. Calculate the gradient of the straight line joining the points $X(5,-7)$ and $Z(-2,-3)$.

(a) $-\frac{4}{7}$ (b) $\frac{4}{7}$ (c) $-\frac{10}{7}$ (d) $-\frac{7}{4}$ (e) None of the above

69. State the equation of an ellipse (a) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ (b) $\frac{x}{a^2}+\frac{y^2}{b}=1$ (c) $\frac{a^2}{x^2}+\frac{b^2}{y^2}=1$

(d) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=0$ (e) None of the above

70. Find the focus and directrix of the parabola $y^2=-12x$
(a) $-3,3$ (b) $3,-3$ (c) $-3,-3$ (d) $-2,2$ (e) None of the above

71. Obtain an equation for the ellipse with vertices $(0,\pm8)$ and foci $(0,\pm5)$

(a) $\frac{y^2}{64}+\frac{x^2}{39}=1$ (b) $\frac{y^2}{64}-\frac{x^2}{39}=-1$ (c) $\frac{y^2}{64}-\frac{x^2}{39}=1$ (d) $\frac{y^2}{8}+\frac{x^2}{13}=1$ (e) None of the above

72. Find the equation of a hyperbola with foci $(\pm4,0)$ and vertices $(\pm2,0)$

(a) $\frac{x^2}{4}-\frac{y^2}{12}=1$ (b) $\frac{x^2}{4}+\frac{y^2}{12}=1$ (c) $\frac{x^2}{4}-\frac{y^2}{12}=-1$ (d) $\frac{x^2}{16}+\frac{y^2}{12}=1$ (e) None of the above

73. Find the equation of a line parallel to $y=-4x+2$ and passes through $(2,3)$.
(a) $y+4x-11=0$ (b) $y-4x-11=0$ (c) $y+4x+11=0$ (d) $y+8x-11=0$ (e) None of the above

74. Find the equation of the line through $(1,1)$ and perpendicular to $2x-3y=4$
(a) $2y+3x-5=0$ (b) $2y-3x-5=0$ (c) $3y+2x-5=0$ (d) $3y-2x-5=0$ (e) None of the above

75. Find the equation of the circle whose diameter has the end points $(-5,1)$ and $(3,-7)$.
(a) $x^2-y^2+2x+6y-22=0$ (b) $x^2+y^2+2x+6y-22=0$ (c) $x^2+y^2-2x-6y-22=0$ (d) $-x^2-y^2-2x+6y-22=0$ (e) None of the above

76. Find the equation of the tangent to the parabola $y^2=12x$ at the point $(3,6)$
(a) $y=x-3$ (b) $y=x+3$ (c) $y=-x+3$ (d) $y=-x-3$ (e) None of the above

77. Find the sum of the vector $\overrightarrow{AB}+\overrightarrow{BC}-\overrightarrow{DC}-\overrightarrow{AD}$ (a) $\overrightarrow{BA}$ (b) $\overrightarrow{DC}$ (c) $\overrightarrow{AD}$ (d) 0 (e) None of the above

78. If the distance between the points (2, 1) and $(q, 8)$ is 7 units, find the value of q.
(a) 1 (twice) (b) 2 (twice) (c) $1, 2$ (d) 2 (e) None of the above

79. Find the eccentricity of the of the hyperbola $\dfrac{x^2}{9} - \dfrac{y^2}{16} = 1$

(a) $\dfrac{5}{3}$ (b) $\dfrac{7}{3}$ (c) 1 (d) 9 (e) None of the above

80. Find the direction cosines $[l, m, n]$ of $\vec{r} = 3i - 2j + 6k$

(a) $\left[\dfrac{3}{7}, \dfrac{2}{7}, \dfrac{6}{7}\right]$ (b) $\left[\dfrac{3}{7}, \dfrac{-2}{7}, \dfrac{6}{7}\right]$ (c) $\left[\dfrac{-3}{7}, \dfrac{-2}{7}, \dfrac{-6}{7}\right]$ (d) $\left[\dfrac{-3}{7}, \dfrac{2}{7}, \dfrac{-6}{7}\right]$ (e) None of the above

81. Given that $\vec{a} = 2i + 3k$, $\vec{b} = 5i - j + k$ and $\vec{c} = i + 2j$, evaluate $2\vec{a} \cdot (\vec{b} + 3\vec{c})$

(a) 32 (b) 36 (c) 38 (d) 44 (e) None of the above

82. Find the vector product of $\vec{P}$ and $\vec{q}$ where $\vec{p} = 3i - 4j + 2k$ and $\vec{q} = 2i + 5j - k$

(a) $-6i + 7j + 23k$ (b) $6i - 7j - 23k$ (c) $-6i - 7j - 23k$ (d) $-6i + 7j + 23k$ (e) None of the above

83. Find the magnitude of the vector $\vec{v} = 3i + 4j - 12k$ (a) 13 (b) 14 (c) 15 (d) 16 (e) None of the above

84. Given the vectors $\vec{a} = i - j + 2k$, $\vec{b} = 2i + j + k$ and $\vec{c} = i + 2j - k$. Find $(\vec{a} \times \vec{b}) \times \vec{c}$

(a) $-9i - 9k$ (b) $-9i + 9k$ (c) $9i - 9k$ (d) $9i + 9k$ (e) None of the above

85. Given that $\vec{a} = 2i + 3k$, $\vec{b} = 5i - j + k$ and $\vec{c} = i + 2j$, evaluate $(\vec{a} - \vec{c}) \cdot (\vec{b} - \vec{c})$

(a) $i - j + 2k$ (b) $i - j + 3k$ (c) $i - j - 2k$ (d) $i - j + 2k$ (e) None of the above

86. Given that $\vec{a} = 2i + 3k$, $\vec{b} = 5i - j + k$ and $\vec{c} = i + 2j$, evaluate $(\vec{a} \cdot \vec{c})\vec{b}$

(a) $10i - 2j - 2k$ (b) $-10i - 2j + 2k$ (c) $10i - 2j + 2k$ (d) $10i + 2j + 2k$ (e) None of the above

87. Given that $\vec{a} = 2i + 3k$, $\vec{b} = 5i - j + k$ and $\vec{c} = i + 2j$, evaluate $(\vec{a} \cdot \vec{c})(\vec{b} \cdot \vec{c})$

(a) 10 (b) 8 (c) 4 (d) 12 (e) None of the above

88. Find the unit vector $\hat{a}$ of the vector $\vec{a} = 2i + 5j - k$, evaluate $(\vec{a} \cdot \vec{c})(\vec{b} \cdot \vec{c})$

(a) $\dfrac{2i + 5j - k}{\sqrt{30}}$ (b) $\dfrac{2i - 5j - k}{30}$ (c) $\dfrac{2i - 5j + k}{\sqrt{30}}$ (d) $\dfrac{2i - 5j}{\sqrt{30}}$ (e) None of the above

89. State the equation of the parabola (a) $y^2 = -4ax$ (b) $y^3 = 4ax$ (c) $y^2 = 4ax$ (d) $y - 4ax = 0$ (e) None of the above

90. State the equation of the hyperbola (a) $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = 1$ (b) $\dfrac{x^2}{a} - \dfrac{y^2}{b} = -1$ (c) $\dfrac{x}{a^2} - \dfrac{y}{b^2} = 1$ (d) $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = 0$ (e) None of the above