Chapter 2

VECTORS AND EQUILIBRIUM

Each question has four possible answers, encircled the correct answer:

1. A scalar quantity can be described by:
- **(a)** Magnitude **(b)** Unit
- **(c)** Magnitude and unit **(d)** Number

2. A vector quantity can be described by magnitude, unit and:
- **(a)** Direction **(b)** Rotation
- **(c)** Dimension **(d)** Unit vector

3. Which one of the following is a vector quantity:
- **(a)** Energy **(b)** Power
- **(c)** Work **(d)** Momentum

4. Which one of the following is a scalar quantity:
- **(a)** Mass **(b)** Displacement
- **(c)** Force **(d)** Torque

5. Two lines are drawn at right angle to each other are known as:
- **(a)** Coordinate axis **(b)** xy-axis
- **(c)** Components **(d)** Cartesian axis

6. A vector which gives the direction of a given vector is called:
- **(a)** Unit vector **(b)** Position vector
- **(c)** Null vector **(d)** Negative vector

7. When a vector is divided by its magnitude we get:
- **(a)** Null vector **(b)** Unit vector
- **(c)** Zero vector **(d)** Position vector

8. Pick out the scalar quantity among the following:
- **(a)** Force **(b)** Torque
- **(c)** Time **(d)** Velocity

9. Pick out the vector quantity among the following:
- **(a)** Power **(b)** Energy
- **(c)** Force **(d)** Mass

10. The magnitude of a null vector is:
- **(a)** One **(b)** Zero
- **(c)** Double **(d)** Negative

11. Null vector is a vector having zero magnitude and:

(a) Arbitrary direction **(b)** No direction

(c) Specific direction **(d)** Opposite direction

12. Unit vector of a vector $\vec{A}$ describes:

(a) Direction of a given vector **(b)** Magnitude of a given vector

(c) Shape of a given vector **(d)** All of above

13. The unit vector of among vector is determined:

(a) By multiplying the vector with its own magnitude

(b) By dividing the vector with its own magnitude

(c) Both (a) and (b)

(d) None of these

14. Unit vector is used to specify:

(a) Direction of a vector **(b)** Position of a vector

(c) Magnitude of a vector **(d)** Dimension of a vector

15. An example of a scalar quantity:

(a) Displacement **(b)** Acceleration

(c) Force **(d)** Speed

16. An example of a vector quantity:

(a) Speed **(b)** Work

(c) Acceleration **(d)** Mass

17. A vector which has magnitude one is called:

(a) Null vector **(b)** Unit vector

(c) Resultant vector **(d)** Position vector

18. A vector which has zero magnitude is called:

(a) Null vector **(b)** Unit vector

(c) Resultant vector **(d)** Position vector

19. The sum of two or more vectors is equal to a single vector which is called:

(a) Component of vector **(b)** Product vector

(c) Null vector **(d)** Resultant vector

20. When a vector $\vec{A}$ is multiplied by a number n, then its magnitude is given by:

(a) $n \times |\vec{A}|$ **(b)** $|n\vec{A}|$

(c) $n \times \vec{A}$ **(d)** None of these

21. When a vector $\vec{A}$ is multiplied by a negative number then its direction:
(a) Remains same (b) Changed by 180°
(c) Does not change (d) None of these

22. When a vector $\vec{A}$ is multiplied by a positive number then its direction:
(a) Remains same (b) Changed by 180°
(c) Does not change (d) None of these

23. The splitting up of a vector into its components is called:
(a) Sum of vector (b) Subtraction of a vector
(c) Resolution of a vector (d) None of these

24. The angle between two rectangular components is:
(a) 60° (b) 90°
(c) 180° (d) 270°

25. The resultant of two anti-parallel vectors $\vec{A}$ and $\vec{B}$ is:
(a) $\vec{A} + \vec{B}$ (b) $\vec{A} - \vec{B}$
(c) Zero (d) None of these

26. Two vectors having same magnitude and direction are called:
(a) Equal vectors (b) Unequal vectors
(c) Null vectors (d) None of these

27. The sum of two equal and opposite vectors is a vector called:
(a) Equal vector (b) Null vector
(c) Position vector (d) Unit vector

28. The magnitude of resultant of a vector $\vec{A}$ is given by:
(a) $\sqrt{A_x^2 + A_y^2}$ (b) $\sqrt{A_x + A_y}$
(c) $A_x^2 + A_y^2$ (d) None of these

29. What is the resultant of 3N and 4N forces acting at right angle to each other:
(a) 90 N (b) 5 N
(c) 7 N (d) 1 N

30. If a force of 10 N makes an angle of 30° with x-axis, its x-component is given by:
(a) 86.6 N (b) 0.866 N
(c) 8.66 N (d) None of these

31. Two forces of 10 N and 7 N respectively are acting to an object. The minimum value of their resultant is:
(a) 0 N (b) 10 N
(c) 7 N (d) 3 N

32. Two forces act together on a body, the magnitude of their resultant is greatest when the angle between the forces is:

(a) 45° (b) 60°
(c) 0° (d) 180°

33. The position vector in xy-plane is written as:

(a) $\vec{r} = x\hat{i} + y\hat{j}$ (b) $\vec{r} = y\hat{i} + z\hat{k}$
(c) $\vec{r} = y\hat{j} + z\hat{k}$ (d) None of these

34. The position vector in xz-plane is written as:

(a) $\vec{r} = x\hat{i} + y\hat{j}$ (b) $\vec{r} = y\hat{j} + z\hat{k}$
(c) $\vec{r} = x\hat{i} + z\hat{k}$ (d) None of these

35. The position vector in yz-plane is given by:

(a) $\vec{r} = x\hat{i} + z\hat{k}$ (b) $\vec{r} = x\hat{i} + y\hat{j}$
(c) $\vec{r} = y\hat{j} + z\hat{k}$ (d) $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$

36. If a force of 50 N is acting along x-axis, then its component along y-axis will be:

(a) The same (b) Zero
(c) Half magnitude (d) None of these

37. A force of 10 N is acting along z-axis, its component along x-axis and y-axis is:

(a) 5 N, 8 N (b) 3 N, 4 N
(c) 5 N each (d) Zero

38. If two vectors of magnitude F_1 and F_2 act on a body at an angle θ, the magnitude of their resultant is:

(a) $\sqrt{F_1^2 + F_2^2}$ (b) $\sqrt{F_1^2 + F_2^2 + 2F_1F_2}$
(c) $\sqrt{F_1^2 + F_2^2 + 2F_1F_2 \cos\theta}$ (d) $F_1^2 + F_2^2 + 2F_1F_2 \cos\theta$

39. The magnitude of a vector $\vec{A} = A_x\hat{i} + A_y\hat{j} + A_z\hat{k}$ is given by:

(a) $A_x + A_y + A_z$ (b) $A_x \cos\theta$
(c) $\sqrt{A_x^2 + A_y^2 + A_z^2}$ (d) None of these

40. If a vector $\vec{A}$ makes an angle θ with x-axis, the magnitude of its, x-component is:

(a) $A_y = A \sin\theta$ (b) $A_x = A \cos\theta$
(c) Both (a) and (b) (d) None of these

41. If a vector $\vec{A}$ makes an angle θ with x-axis, the magnitude of its y-component is:

(a) $A_y = A \sin\theta$ (b) $A_x = A \cos\theta$
(c) Both (a) and (b) (d) None of these

42. The reverse process of vector addition is called:

(a) Subtraction of a vector **(b)** Addition of a vector
(c) Negative of a vector **(d)** Resolution of a vector

43. The expression $\vec{r} = a\hat{i} + b\hat{j}$ is for:

(a) Unit vector **(b)** Position vector
(c) Null vector **(d)** Negative vector

44. The direction of a resultant vector $\vec{R}$ is given by:

(a) $\theta = \tan^{-1}\left(\frac{R_x}{R_y}\right)$ **(b)** $\theta = \tan^{-1}\left(\frac{R_y}{R_x}\right)$
(c) $\theta = \sin^{-1}\left(\frac{R_y}{R_x}\right)$ **(d)** None of these

45. If both the components of a vector are negative then vector is in:

(a) 1^{st} quadrant **(b)** 2^{nd} quadrant
(c) 3^{rd} quadrant **(d)** 4^{th} quadrant

46. The scalar product is also known as:

(a) Vector product **(b)** Dot product
(c) Vector sum **(d)** Scalar sum

47. The scalar product of $\vec{A}$ and $\vec{B}$ is given by:

(a) $\vec{A} \times \vec{B}$ **(b)** $\vec{A} \cdot \vec{B}$
(c) $\vec{A} - \vec{B}$ **(d)** AB

48. The projection of vector $\vec{A}$ on $\vec{B}$ is given by:

(a) $\frac{\vec{A} \cdot \vec{B}}{|A|}$ **(b)** $\frac{\vec{A} \cdot \vec{B}}{|\vec{B}|}$
(c) $AB\cos\theta$ **(d)** $\frac{\vec{A} \cdot \vec{B}}{A\cos\theta}$

49. The self scalar product of $\vec{A}$ is given by:

(a) $\sqrt{A}$ **(b)** A^3
(c) A^2 **(d)** A

50. If $\vec{A}$ and $\vec{B}$ are anti-parallel then their scalar product is:

(a) $AB\cos\theta$ **(b)** $-AB$
(c) $-AB\cos\theta$ **(d)** Zero

51. The scalar product of two similar unit vector is:

(a) One **(b)** Zero

(c) Twice **(d)** Negative

52. If $\vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{A}$ this is called:

(a) Commutative law **(b)** Associative law

(c) Distributive law **(d)** None of these

53. If the multiplication of two vectors results into a vector quantity then the product is called:

(a) Dot product **(b)** Vector product

(c) Scalar product **(d)** None of these

54. If the multiplication of two vectors result into a scalar quantity then the product is called:

(a) Vector product **(b)** Cross product

(c) Scalar product **(d)** None of these

55. If $\vec{A} \times \vec{B}$ points along positive z-axis, then vector $\vec{A}$ and $\vec{B}$ will lie in:

(a) zx-plane **(b)** xy-plane

(c) yz-plane **(d)** None of these

56. If two vectors $\vec{A}$ and $\vec{B}$ are non-parallel vectors then the direction of $\vec{A} \times \vec{B}$ is along:

(a) y-axis **(b)** z-axis

(c) x-axis **(d)** None of these

57. Select the correct answer:

(a) $\hat{i} \cdot \hat{j} = \hat{k}$ **(b)** $\hat{i} \cdot \hat{j} = 0$

(c) $\hat{i} \cdot \hat{j} = -\hat{k}$ **(d)** $\hat{i} \cdot \hat{j} = 1$

58. Select the correct one:

(a) $\vec{A} \cdot \vec{B} = -\vec{B} \cdot \vec{A}$ **(b)** $\vec{A} \cdot \vec{B} = \frac{1}{2} \vec{B} \cdot \vec{A}$

(c) $\vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{A}$ **(d)** None of these

59. Which of the following unit vectors represent the direction of normal drawn on a specific surface:

(a) $\hat{j}$ **(b)** $\hat{i}$

(c) $\hat{n}$ **(d)** $\hat{k}$

60. If $\hat{A} = 2\hat{i} + 4\hat{j} + 5\hat{k}$ and $\vec{B} = -2\hat{i} + 2\hat{j} + \hat{k}$. What will be the value of $\vec{A} \cdot \vec{B}$:

(a) 9 **(b)** −9

(c) 5 **(d)** 10

61. If $\vec{A} = 2\hat{i} + 2\hat{j} + \hat{k}$ then the value of $\hat{B}$ is:

(a) $\frac{2\hat{i} + 2\hat{j} + \hat{k}}{5}$ (b) $\frac{2\hat{i} + 2\hat{j} + \hat{k}}{9}$

(c) $\frac{2\hat{i} + 2\hat{j} + \hat{k}}{3}$ (d) None of these

62. The scalar product of two vectors is zero when:

(a) They are equal vectors (b) They are in the same direction

(c) They are at right angle (d) None of these

63. If the vectors $\vec{A}$ and $\vec{B}$ are parallel to each other then:

(a) $\vec{A} \cdot \vec{B} = AB$ (b) $\vec{A} \cdot \vec{B} = \pm AB$

(c) $\vec{A} \cdot \vec{B} = 0$ (d) $\vec{A} \cdot \vec{B} = AB \cos\theta$

64. If $\vec{A} = A_x\hat{i} + A_y\hat{j} + A_z\hat{k}$ and $\vec{B} = B_x\hat{i} + B_y\hat{j} + B_z\hat{k}$ then the value of $\vec{A} \cdot \vec{B}$ is:

(a) $A_xB_x + A_yB_z + A_zB_y$ (b) $A_xB_x + A_yB_y + A_zB_z$

(c) $A_yB_x + A_xB_y + A_zB_z$ (d) None of these

65. The scalar product of two vectors will be negative if:

(a) They are at right angle to each other (b) They are parallel

(c) They are anti-parallel (d) None of these

66. The dot product of $\hat{i} \cdot \hat{i} = \hat{j} \cdot \hat{j} = \hat{k} \cdot \hat{k}$ is equal to:

(a) 0 (b) 1

(c) −1 (d) 2

67. The dot product of $\hat{i} \cdot \hat{j} = \hat{j} \cdot \hat{k} = \hat{k} \cdot \hat{i}$ is equal to:

(a) 0 (b) 1

(c) −1 (d) 2

68. The vector product of two vectors $\vec{A}$ and $\vec{B}$ is given by:

(a) $AB \sin\theta$ (b) $AB \sin\theta\, \hat{n}$

(c) $\overrightarrow{AB} \sin\theta$ (d) $AB\, \hat{n}$

69. Vector product does not hold:

(a) Commutative law (b) Associative law

(c) Distributive law (d) None of these

70. The direction of vector product is:

(a) Parallel to plane (b) Perpendicular to plane

(c) Anti-parallel (d) Along the plane

71. Self cross-product of a vector is equal to:

(a) Zero **(b)** One
(c) Double **(d)** Negative

72. The cross product of unit vectors $\hat{i} \times \hat{i} = \hat{j} \times \hat{j} = \hat{k} \times \hat{k}$ is:

(a) One **(b)** $\hat{i}$
(c) $\hat{k}$ **(d)** Zero

73. If $\vec{A} \times \vec{B} = 0$ then the angle between the vectors is:

(a) 60° **(b)** 90°
(c) 270° **(d)** 180°

74. The magnitude of $\vec{A} \times \vec{B}$ is equal to area of:

(a) Triangle **(b)** Circle
(c) Parallelogram **(d)** Rectangle

75. The cross product of two vectors will be negative when:

(a) They are anti-parallel **(b)** They are parallel
(c) They are rotated through an angle of 270° **(d)** None of these

76. The cross product of two parallel vectors $\vec{A}$ and $\vec{B}$ is equal to:

(a) $AB \sin\theta \,\hat{n}$ **(b)** $AB \sin\theta$
(c) AB **(d)** Zero

77. Select the correct one:

(a) $\vec{A} \cdot \vec{B} = -\vec{A} \cdot \vec{B}$ **(b)** $\vec{A} \times \vec{B} \neq \vec{B} \times \vec{A}$
(c) $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$ **(d)** None of these

78. The cross product of $\hat{i} \times \hat{j}$ is equal to:

(a) $\hat{k}$ **(b)** $-\hat{k}$
(c) $\vec{k}$ **(d)** $\hat{i}$

79. The cross product of $\hat{j} \times \hat{i}$ is equal to:

(a) $\hat{k}$ **(b)** $-\hat{k}$
(c) $\vec{k}$ **(d)** $\hat{i}$

80. Select the correct one:

(a) $\hat{j} \times \hat{k} = \hat{i}$ **(b)** $\hat{j} \times \hat{k} = -\hat{i}$
(c) $\hat{j} \times \hat{k} = \hat{j}$ **(d)** $\hat{j} \times \hat{k} = \hat{k}$

81. The turning effect of a force is called its moment or:

(a) Momentum **(b)** Inertia

(c) Torque **(d)** Impulse

82. The perpendicular distance from the line of action to the pivot is called:

(a) Displacement **(b)** Momentum

(c) Moment distance **(d)** Moment arm

83. The SI unit of torque is:

(a) $N \cdot m^2$ **(b)** $N \cdot m$

(c) N/m^2 **(d)** N^2m

84. The expression for torque is given by:

(a) $rF\cos\theta$ **(b)** $rF\sin\theta\,\hat{n}$

(c) $rF\sin\theta$ **(d)** $rF\cos\theta\,\hat{n}$

85. Torque acting on a body determines its:

(a) Velocity **(b)** Momentum

(c) Force **(d)** Angular momentum

86. When line of action of applied force passes through the pivot point then torque will be:

(a) Maximum **(b)** Constant

(c) Negative **(d)** Zero

87. The direction of torque $\vec{\tau} = \vec{r} \times \vec{F}$ is determined by:

(a) Head to tail rule **(b)** Right hand rule

(c) Left hand rule **(d)** None of these

88. Conventionally anti-clock wise torque is taken as:

(a) Zero **(b)** Negative

(c) Positive **(d)** None of these

89. Conventionally clockwise torque is taken as:

(a) Zero **(b)** Negative

(c) Positive **(d)** None of these

90. Torque is also called as:

(a) Moment of inertia **(b)** Moment arm

(c) Moment of force **(d)** Angular velocity

91. The dimension of torque are:

(a) $[ML^2T^{-2}]$ **(b)** $[MLT^{-1}]$

(c) $[ML^3T]$ **(d)** $[M^2LT^{-2}]$

92. Torque = ________ × Force:

(a) Velocity **(b)** Momentum

(c) Arm of the weight **(d)** Moment arm

93. Let torque = $\vec{\tau} = \vec{r} \times \vec{F}$ then direction of torque is:

(a) In the direction $\vec{F}$ **(b)** In the direction of $\vec{r}$
(c) Normal to the plane **(d)** None of these

94. Two equal and opposite forces acting on a body form a:

(a) Momentum **(b)** Torque
(c) Couple **(d)** None of these

95. The point at which the whole weight of the body acts is called:

(a) Torque **(b)** Centre of gravity
(c) Centre of mass **(d)** Centre of the body

96. The centre of gravity of a uniform body is:

(a) At the axis of rotation of the body **(b)** At its centre
(c) At its one end **(d)** None of these

97. The centre of gravity of a triangular plate is:

(a) At the axis of rotation of the body **(b)** At its centre
(c) At the intersections of medians **(d)** None of these

98. If a body is at rest or moving with uniform velocity then it is said to be in:

(a) Torque **(b)** Equilibrium
(c) Both (a) and (b) **(d)** None of these

99. Torque has zero value if angle between $\vec{r}$ and $\vec{F}$:

(a) 60° **(b)** 45°
(c) 90° **(d)** 0°

100. The torque has maximum value if angle between $\vec{r}$ and $\vec{F}$ is:

(a) 60° **(b)** 45°
(c) 90° **(d)** 0°

101. A body will be in translational equilibrium if:

(a) $\Sigma\vec{F} = 0$ **(b)** $\Sigma\vec{\tau} = 0$
(c) $\Sigma\vec{F_y} = 0$ **(d)** None of these

102. The condition of complete equilibrium is satisfied if:

(a) Vector sum of all the torques is zero **(b)** Vector sum of all forces and torques is zero
(c) Vector sum of all the forces is zero **(d)** None of these

103. $\hat{i} \cdot (\hat{j} \times \hat{k})$ is equal to:

(a) $\hat{k}$ **(b)** 2
(c) 1 **(d)** 0

104. If $|\bar{a} + \bar{b}| = |\bar{a} - \bar{b}|$ then angle between $\bar{a}$ and $\bar{b}$ is:

(a) 90° **(b)** 0°

(c) 180° **(d)** 45°

105. If $\vec{A} = 2\hat{i} + \hat{j} + 2\hat{k}$ then $|A|$ is:

(a) zero **(b)** 3

(c) 5 **(d)** 9

106. In rotational motion the analogue of force is:

(a) Moment arm **(b)** Torque

(c) Moment of inertia **(d)** None of these

107. The component of $9\hat{i} + 17\hat{j}$ along z-axis is:

(a) Zero **(b)** 18

(c) 26 **(d)** 11

108. If $|\vec{A} + \vec{B}| = |\vec{A} - \vec{B}|$, angle between $\vec{A}$ and $\vec{B}$ is:

(a) 0° **(b)** 90°

(c) 60° **(d)** 180°

109. If vectors $2\hat{i} + 4\hat{j} - 7\hat{k}$ and $2\hat{i} + 6\hat{j} + q\hat{k}$ are perpendiculars then value of q is:

(a) 4 **(b)** 7

(c) 8 **(d)** 10

110. The resultant of two vectors of magnitude 2 and 3 is 1. The angle between them is:

(a) 90° **(b)** 180°

(c) 0° **(d)** None of these

111. $|\hat{i} - \hat{j} - 3\hat{k}| =$

(a) $\sqrt{5}$ **(b)** $\sqrt{7}$

(c) $\sqrt{11}$ **(d)** $\sqrt{13}$

112. Resultant of two vectors of magnitude 24 and 7 is 25. The angle between them is:

(a) 90° **(b)** 180°

(c) 360° **(d)** 270°

113. If $|\vec{A} \times \vec{B}| = \sqrt{3}\,(\vec{A} \cdot \vec{B})$. Angle between $\vec{A}$ and $\vec{B}$ is:

(a) $\frac{\pi}{2}$ **(b)** $\frac{\pi}{4}$

(c) $\frac{\pi}{6}$ **(d)** $\frac{\pi}{3}$

114. If $\vec{P} = 3\hat{i} + 4\hat{j} - 2\hat{k}$, $\vec{Q} = 4\hat{i} - 3\hat{j} + 2\hat{k}$. Unit vector in the direction of $\vec{P} + \vec{Q}$ is:

(a) $7\hat{i} + \hat{j}$ **(b)** $\dfrac{7\hat{i} + \hat{j}}{5}$

(c) $\dfrac{1}{29}(2\hat{i} - 14\hat{j} - 25\hat{k})$ **(d)** None of these

115. Area of parallelogram =

(a) $\vec{A} \,.\, \vec{B}$ **(b)** $\vec{A} \times \vec{B}$

(c) $|\vec{A} \times \vec{B}|$ **(d)** None of these

116. If the resultant of two vectors each of magnitude F is also of magnitude F, the angle between them is:

(a) 60° **(b)** 90°

(c) 180° **(d)** 120°

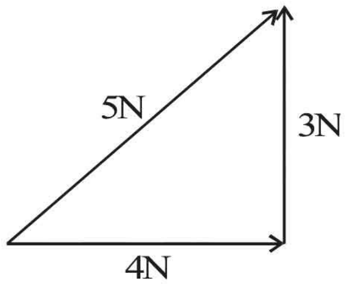
117. The resultant of two forces 3N and 4N making an angle 60° with each other is:

(a) 5 **(b)** 7

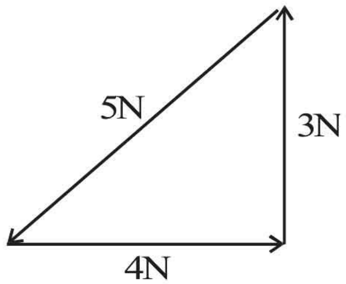
(c) 6.1 **(d)** 1

118. Which diagram correctly shows the addition of 4N and 3N vectors?

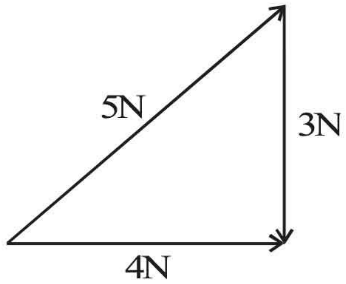
(a)



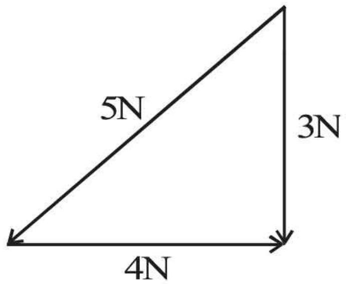
(b)



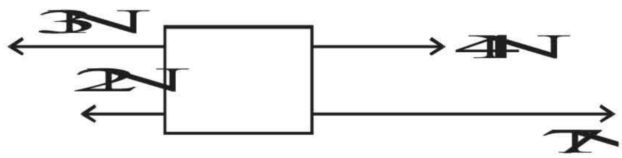
(c)



(d)



119. What is the resultant forces in diagram shown?



(a) Zero

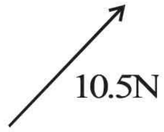
(b) 6N to left

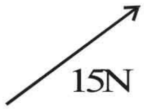
(c) 6N to right

(d) 11N to right

120. A 9N force and a 12N force acting at right angles as shown in figure. Which of the following diagrams shows resultant force?

(a) 

(b) 

(c) 

(d) 

121. If position vector $\vec{r}$ and force $\vec{F}$ are in same direction then torque will be:

(a) Maximum **(b)** Minimum

(c) Same **(d)** None of these

122. If a vector is multiplied by a scalar then new quantity is:

(a) Scalar **(b)** Vector

(c) Both (a), (b) **(d)** None of these

123. If θ is angle between $\vec{A}$ and $\vec{B}$ then their resultant:

(a) $\sqrt{A^2 + B^2}$ **(b)** $\sqrt{A^2 + B^2 + 2AB\cos\theta}$

(c) $\sqrt{A^2 - B^2}$ **(d)** $\sqrt{A^2 + B^2 - AB\sin\theta}$

124. Scalar product of two vectors obey … law:

(a) Commutative **(b)** Distributive

(c) Associative **(d)** All

125. The angle between $\vec{A} \times \vec{B}$ and $\vec{B} \times \vec{A}$ is:

(a) 0° **(b)** 180°

(c) 90° **(d)** 45°

126. If $\vec{A}$ and $\vec{B}$ are parallel to each other then:

(a) $\vec{A} . \vec{B} = 0$ **(b)** $\vec{A} . \vec{B} = 1$

(c) $\vec{A} . \vec{B} = AB$ **(d)** $\vec{A} \times \vec{B} = AB$

127. The magnitude of vector product of two vectors is $\sqrt{3}$ times then scalar product. Angle between vectors is:

(a) $\frac{\pi}{2}$ **(b)** $\frac{\pi}{6}$

(c) $\frac{\pi}{3}$ **(d)** $\frac{\pi}{4}$

128. The magnitude of the resultant of two forces is 10 N. One of the forces is of magnitude $10\sqrt{2}$ N. It makes an angle of 45° with resultant. The magnitude of other force is:

(a) 10 N **(b)** $10\sqrt{2}$ N

(c) 100 N **(d)** 10^9 N

129. A girl can throw a ball horizontally with a velocity 6 ms^{-1}. If she throws the ball at that speed while moving in a car at a speed of 8 ms^{-1} in a direction at right angles to the motion of the car, then the resultant velocity, in magnitude is:

(a) 2 ms^{-1} **(b)** 4 ms^{-1}

(c) 6 ms^{-1} **(d)** 10 ms^{-1}

130. Two forces of magnitudes 8 N and 15 N act at a point. If the resultant force is 17 N, then the angle between the forces has to be:

(a) 60° **(b)** 45°

(c) 90° **(d)** 30°

131. A vector $\vec{A}$ is added to the sum of two vectors $3\hat{i} - 2\hat{j} - 2\hat{k}$ and $2\hat{i} - \hat{j} + 3\hat{k}$ such that the resultant is a unit vector along z-axis. The value of $\vec{A}$ is:

(a) $-5\hat{i} + 3\hat{j}$ **(b)** $5\hat{i} - 3\hat{j}$

(c) $\hat{i} - \hat{k}$ **(d)** $\hat{k} + \hat{i} - \hat{j}$

132. A person travels 4 km east, then 4 km south and finally travels in such away that his journey terminates 8 km directly east of the starting point. What is the magnitude of the displacement during the third leg of the journey?

(a) 4 km **(b)** $\frac{4}{\sqrt{2}}$ km

(c) $4\sqrt{2}$ km **(d)** 16 km

133. The vector sum of N coplanar forces each of magnitude F, when each force is making an angle of $\frac{2\pi}{N}$ with that preceding it, is:

(a) F **(b)** $\frac{NF}{2}$

(c) NF **(d)** Zero

134. A vector $\vec{F_1}$ is along the positive direction of x-axis. Its vector product with another vector $\vec{F_2}$ is zero. Now, $\vec{F_2}$ is possibly equal to:

(a) $3\hat{j}$ **(b)** $-17.5(\hat{i} + \hat{j})$

(c) $11(\hat{j} + \hat{k})$ **(d)** $-2\hat{i}$

135. The resultant of three vectors whose magnitudes are 3 units in east, 12 units in north and 4 units vertically upwards is:

(a) $\sqrt{24}$ **(b)** 13

(c) $\sqrt{265}$ **(d)** 19

136. If the magnitudes of the vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$ are 3, 4 and 5 units respectively and if $\vec{A} + \vec{B} = \vec{C}$, then the angle between $\vec{B}$ and $\vec{C}$ is:

(a) $\pi/2$ **(b)** arc cos (0.8)

(c) arc tan (0.75) **(d)** $\pi/4$

137. The point of application of the applied force $\vec{F} = 5\hat{i} - 3\hat{j} + 2\hat{k}$ is moved from $\vec{r_1} = 2\hat{i} + 7\hat{k} + 4\hat{k}$ to $\vec{r_2} = -5\hat{i} + 2\hat{j} + 3\hat{k}$. The work done by the applied force is:

(a) −22 units **(b)** 0 units

(c) −79.5 units **(d)** −9.8 units

138. If $0.6\hat{i} + 0.4\hat{j} + c\hat{k}$ represents a unit vector, then c is:

(a) 0.8 **(b)** $\sqrt{0.48}$

(c) $\sqrt{0.52}$ **(d)** Zero

139. Given $|\hat{a} . \hat{b}|^2 - |\hat{a} \times \hat{b}|^2 = c$. What is value of c?

(a) ab sin θ **(b)** ab $\cos^2 \theta$

(c) sin 2θ **(d)** cos 2θ

140. If $\vec{P} . \vec{Q} = |\vec{P} \times \vec{Q}|$. What is angle between $\vec{P}$ and $\vec{Q}$?

(a) 30° **(b)** 45°

(c) 60° **(d)** 90°

141. If $\vec{A} \times \vec{B} = \vec{B} \times \vec{C} = \vec{C} \times \vec{A}$. Then:

(a) $\vec{A} = 0$ **(b)** $\vec{A} + \vec{B} = 0$

(c) $\vec{B} + \vec{C} = 0$ **(d)** $\vec{A} + \vec{B} + \vec{C} = 0$

ANSWERS

1.	(c)	2.	(a)	3.	(d)	4.	(a)
5.	(d)	6.	(a)	7.	(b)	8.	(c)
9.	(c)	10.	(b)	11.	(a)	12.	(d)
13.	(b)	14.	(a)	15.	(d)	16.	(c)
17.	(b)	18.	(a)	19.	(d)	20.	(a)
21.	(b)	22.	(c)	23.	(c)	24.	(b)
25.	(b)	26.	(a)	27.	(b)	28.	(a)
29.	(b)	30.	(c)	31.	(d)	32.	(c)
33.	(a)	34.	(c)	35.	(c)	36.	(b)
37.	(d)	38.	(c)	39.	(c)	40.	(b)
41.	(a)	42.	(d)	43.	(b)	44.	(b)
45.	(c)	46.	(b)	47.	(b)	48.	(b)
49.	(c)	50.	(b)	51.	(a)	52.	(a)
53.	(b)	54.	(c)	55.	(b)	56.	(b)
57.	(b)	58.	(c)	59.	(c)	60.	(a)
61.	(c)	62.	(c)	63.	(a)	64.	(b)
65.	(c)	66.	(b)	67.	(a)	68.	(b)
69.	(a)	70.	(b)	71.	(a)	72.	(d)
73.	(d)	74.	(c)	75.	(b)	76.	(d)
77.	(b)	78.	(a)	79.	(b)	80.	(a)
81.	(c)	82.	(d)	83.	(b)	84.	(b)
85.	(b)	86.	(d)	87.	(b)	88.	(c)
89.	(b)	90.	(c)	91.	(a)	92.	(d)
93.	(c)	94.	(c)	95.	(b)	96.	(b)
97.	(c)	98.	(b)	99.	(d)	100.	(c)
101.	(a)	102.	(b)	103.	(c)	104.	(a)
105.	(b)	106.	(b)	107.	(a)	108.	(b)
109.	(a)	110.	(b)	111.	(c)	112.	(a)
113.	(d)	114.	(b)	115.	(c)	116.	(d)
117.	(c)	118.	(a)	119.	(c)	120.	(c)
121.	(b)	122.	(b)	123.	(b)	124.	(d)
125.	(b)	126.	(c)	127.	(c)	128.	(a)
129.	(d)	130.	(c)	131.	(a)	132.	(c)
133.	(d)	134.	(d)	135.	(b)	136.	(b)
137.	(a)	138.	(b)	139.	(d)	140.	(b)
141.	(d)						