Q13. Two blocks of mass $m_1 = 24.0$ kg and $m_2$, respectively, are connected by a light string that passes over a massless pulley as shown in Fig. 2. If the tension in the string is $T = 294$ N. Find the value of $m_2$. (Ignore friction) (40.0 kg)

Q14. Two horizontal forces of equal magnitudes are acting on a box sliding on a smooth horizontal table. The direction of one force is the north direction; the other is in the west direction. What is the direction of the acceleration of the box? (45° west of north)

Q16. A 5.0 kg block is lowered with a downward acceleration of 2.8 m/s$^2$ by means of a rope. The force of the block on the rope is: (35 N, down)

Q17. Two students are dragging a box (m=100 kg) across a horizontal frozen lake. The first student pulls with force $F_1 = 50.0$ N, while the second pulls with force $F_2$. The box is moving in the x-direction with acceleration $a$ (see Fig. 3). Assuming that friction is negligible, what is $F_2$?

Q13. A constant force $F$ of magnitude 20 N is applied to block $A$ of mass $m = 4.0$ kg, which pushes block $B$ as shown in Fig. 5. The block slides over a frictionless flat surface with an acceleration of 2.0 m/s$^2$. What is the net force on block $B$? (12 N)

Q14. Only two forces act upon a 5.0 kg box. One of the forces is $\vec{F}_1 = (6.0 \hat{i} + 8.0 \hat{j})$ N. If the box moves at a constant velocity of $(1.6 \hat{i} + 1.2 \hat{j})$ m/s, what is the magnitude of the second force? (10. N)
Q15. An elevator of mass 480 kg is designed to carry a maximum load of 3000 N. What is the tension in the elevator cable at maximum load when the elevator moves down accelerating at 9.8 m/s²? (0)

Q16.: A car of mass 1000 kg is initially at rest. It moves along a straight road for 20 s and then comes to rest again. The velocity – time graph for the movement is given in Fig.6. The magnitude of the net force that acts on the car while it is slowing down to stop from t = 15 s to t = 20 s is: (2000N)

T062
Q15.: Two blocks of masses $m_1 = 4.00\, \text{kg}$ and $m_2 = 2.00\, \text{kg}$ are connected by a string passing over a massless and frictionless pulley and placed on a frictionless horizontal table as shown in Fig. 3. A force of $F = 10.0\, \text{N}$ at an angle of 60.0° with the horizontal is applied to $m_1$. The magnitude of acceleration of the system is: (2.43 m/s²)

Q18. Two boxes $A$ and $B$ ($m_A = 3.0\, \text{kg}$ and $m_B = 1.0\, \text{kg}$) are in contact on a horizontal frictionless surface and move along the x-axis (see Fig. 4). A horizontal force is applied on Box $A$. The net force acting on $A$ is $F_1$ and on $B$ is $F_2$. Which one of the following statements is correct? ($F_1 = 7.5\, \text{i N}$, $F_2 = 2.5\, \text{i N}$)
Q19. Two boxes, one of mass \( m = 5.00 \text{ kg} \) and the other with an unknown mass \( M \) are connected with a string passing over a massless frictionless pulley and are placed on frictionless planes as shown in Fig. 5. What must be the mass \( M \), if it goes down the plane with an acceleration of \( a = 2.45 \text{ m/s}^2 \)? (19.1 kg)

Q20: A 2.00-kg mass is hanging from the ceiling of an elevator accelerating upward at \( a = 2.50 \text{ m/s}^2 \) (see Fig. 6). What is the tension \( T \) in the string? (24.6 N)

T061
Q13. A 4.0 kg block is pushed upward a 30° inclined frictionless plane with a constant horizontal force \( F \) (Fig 4). If the block moves with a constant speed find the magnitude of the force \( F \). (23 N)

Q14. An elevator cab with a total mass of 2000 kg is pulled upward by a cable. If the elevator accelerates at \( 2.00 \text{ m/s}^2 \) upward, find the tension in the cable. \((2.36 \times 10^4 \text{ N})\)

Q16. A 7.0 kg block and a 3.0 kg block are connected by a string as shown in Fig 5. If the pulley is massless and the surface is frictionless, the magnitude of the acceleration of the 3.0 kg block is: \((2.9 \text{ m/s}^2)\)
T052

Q13. A 5.0-kg mass is suspended by a string from the ceiling of an elevator that is moving downward with constant acceleration of 2.8 m/s². The tension in the string is: (35 N)

Q14. A 3.0-kg block slides on a frictionless 37° incline plane. A vertical force of 15 N is applied to the block (see Fig 4). The acceleration of the block is: (2.9 m/s² down the incline)

Q15. Two blocks of mass $m_1 = 5.0$ kg and $m_2 = 10$ kg are connected by a massless rod and slide on a frictionless 30° incline as shown in Fig 5. The tension in the rod is: (zero)

Q16. A 2.3-N weight is suspended by a string from a ceiling and held at an angle $\theta$ from the vertical by 4.0-N horizontal force $F$ as shown in Fig 6. The tension in the string is: (4.6 N)

Q20. Three equal mass blocks each of mass =2.0 kg can move together over a horizontal frictionless surface. Two forces, $F_1 = 40$ i N and $F_2 = -10$ i N are applied on the three masses system as shown in the Fig 7. The net force on the middle mass is: (10 i N)
T051

Q14. A block of mass \(m_1=5.7\) kg on a frictionless 30° inclined plane is connected by a cord over a massless, frictionless pulley to a second block of mass \(m_2=3.5\) kg hanging vertically as shown in Fig 4. The acceleration of \(m_2\) is: (0.69 m/s downward)

Q15. Fig.5 shows a block A of mass 6.0 kg and block B of 8.0 kg connected by a rigid rod of negligible mass. Force \(F_a=16 i\) N acts on block A; force \(F_b=-30 i\) N acts on block B. The tension (T) in the rod is: (Neglect friction) (22 N)

Q16. A 5.0-kg mass is held at an angle \(\theta\) from the vertical by a horizontal force \(F=15\) N as shown in Fig 6. The tension (T) in the string supporting the mass (in Newton) is: (Ans: 51)

Q17. A 0.20-kg stone is attached to a string and whirled in a circle of radius \(r=0.60\) m on a horizontal frictionless surface as shown in Fig. 7. If the stone makes 150 revolutions per minute, the tension (T) in the string is: (30 N)