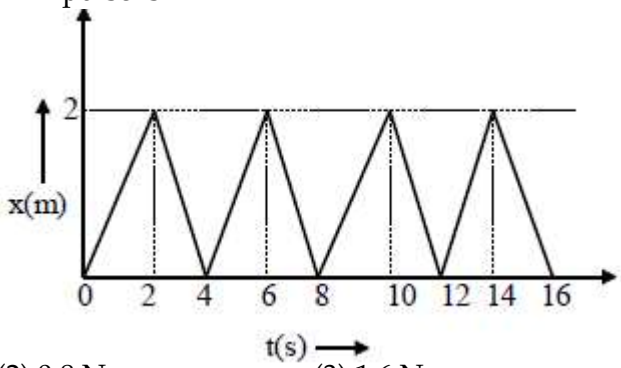
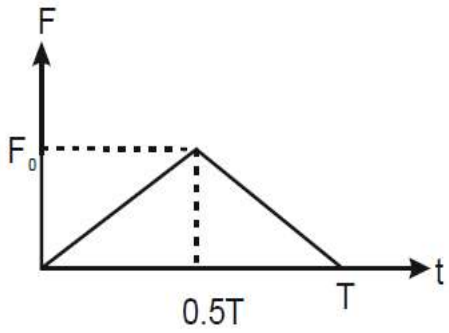
41. A rocket of initial mass 1500 kg ejects gas at a constant rate of 10 kgs^{-1} with a relative speed of 5 kms^{-1}. The acceleration of the rocket 50 seconds after the blast, neglecting gravity
(1) $10ms^{-2}$ (2) $25ms^{-2}$ (3) $50ms^{-2}$ (4) $100ms^{-2}$

42. The figure shows the position-time $(x-t)$ graph of one-dimensional motion of a body of mass 0.4 kg. The magnitude of each impulse is



(1) 0.4 N-s (2) 0.8 N-s (3) 1.6 N-s (4) 0.2 N-s

43. A ball of mass m moving with a velocity u collides a wall normally. The collision is assumed to be elastic and the force of Interaction between the ball and wall varies as shown in Fig. Then the value of F_0 is



(1) mu/T (2) 2 mu/T (3) 4 mu/T (4) mu/2T

44. A shell at rest at the origin explodes into three fragments of masses 1kg, 2kg and m kg. The 1kg and 2kg pieces fly off with speeds of $5ms^{-1}$ along x- axis and $6ms^{-1}$ a long y-axis respectively. If the m kg piece flies off with a speed of $6.5ms^{-1}$, the total mass of the shell must be
(1) 4kg (2)5kg (3)3.5kg (4) 4.5kg

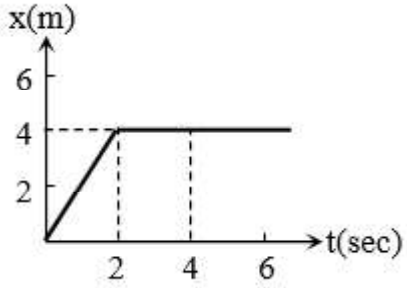
45. A body of mass 5kg starts from the origin with an initial velocity $\vec{u} = 30\hat{i} + 40\hat{j}\, ms^{-1}$. If a constant force $\vec{F} = -\left(\hat{i} + 5\hat{j}\right)N$ acts on the body, the time in which the y-component of the velocity becomes zero is
(1) 5 seconds (2) 20 seconds (3) 40 seconds (4) 80 seconds

46. If a bullet of mass 5 gm moving with velocity 100 m / sec, penetrates the wooden block upto 6 cm. Then the average force imposed by the bullet on the block is
(1) 8300 N (2)417 N (3) 830 N (4)Zero

47. In a rocket of mass 1000 kg fuel is consumed at a rate of 40 kg/s. The velocity of the gases ejected from the rocket is 5×10^4 m / s . The thrust on the rocket is
(1) 2×10^3 N (2) 5×10^4 N (3) 2×10^6 N (4) 2×10^9 N

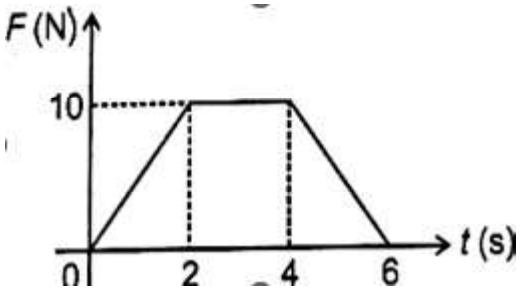
48. A player caught a cricket ball of mass 150 gm moving at the rate of 20 m/sec. if the catching process be completed in 0.1 sec the force of the blow exerted by the ball on the hands of player is
(1)0.3 N (2)30 N (3)300 N (4)3000 N

49. In the figure given below, the position-time graph of a particle of mass 0.1 kg is shown. The impulse at $t = 2\,\text{sec}$ is



(1) $0.2\,\text{kg m sec}^{-1}$ (2) $-0.2\,\text{kg m sec}^{-1}$ (3) $0.1\,\text{kg m sec}^{-1}$ (4) $-0.4\,\text{kg m sec}^{-1}$

50. The force (F) acting on a particle varies with the time (t) as shown in the figure. The change in momentum during t = 0 to t = 6 s is



(1) 80 N s (2) 40 N s (3) 20 N s (4) 0 N s