

ENGINEERING MECHANICS [0BSES112]

Model Answer

Q1a	Define moment Define couple of a force. Effect of moment and couple, with diagram	02 02 02	
Q1b	Resolution and Representation of resultant force in a quadrant $\sum F_x = -1000.0125 \text{ N}$ $\sum F_y = 1199.90 \text{ N}$ $R = 1561.981 \text{ N}$ $\theta = 50^\circ$ $M_A = 7501.468 \text{ Ncm}$ Perpendicular distance = 4.8025 cm	01 1 1 02 01 02 01	
Q1b	FBD of joint B and C. $T_{AB} = 326.79 \text{ N}$ $T_{BC} = 336.602 \text{ N}$ $T_{BD} = 183.012 \text{ N}$ $T_{DE} = 224.143 \text{ N}$	01 02 02 02 02	
Q2a	Definition of friction Angle of friction Angle of repose	02 02 02	
Q2b	Showing reaction and Converting UDL or UVL into point load $V_A = 26.025 \text{ N}$ $H_A = 11.14 \text{ N}$ $R_B = 15.44 \text{ N}$	02 03 02 02	
Q2b	FBD of block "A" for 2 cases Tension in the string = 800 N Case I) $P = 1252 \text{ N}$ Case I) $P = 132.82 \text{ N}$	02 01 03 03	
Q3a	Area and x_1, y_1, \dots $\bar{X} = 1 \text{ m}$, $\bar{Y} = 2.38 \text{ m}$	2 3 3	
Q3b	Motion equations relationship between distance & velocity relationship between Velocity and acceleration	2 3 3	
Q3C	Area and x_1, y_1, \dots $\bar{X} = 2.805 \text{ m}$ $\bar{Y} = 2.3417 \text{ m}$	2 3 3	
Q4A	Statement of perpendicular axis theorem. Formula and Sketch	3 3	

Q4B	Area and x_1, y_1, \dots	2	
	$\bar{Y} = 160.71 \text{ mm}$	2	
	$I_{xx1} = 526.973 \times 10^6 \text{ mm}^4$	2	
	$I_{xx2} = 232.086 \times 10^6 \text{ mm}^4$	2	
	$I_{xx3} = 392.2139 \times 10^6 \text{ mm}^4$	2	
	$I_{xx} = 1.15 \times 10^9 \text{ mm}^4$	2	
Q4B	Area and x_1, y_1, \dots	2	
	$\bar{X} = 2.934 \text{ m}, \bar{Y} = 2.304 \text{ m}$	2	
	$I_{xx1 \text{ rectangle}} = 68.956 \text{ m}^4$	3	
	$I_{xx2 \text{ triangle}} = 12.661 \text{ m}^4$	3	
	$I_{xx} = 56.294 \text{ m}^4$	2	
Q5A	Acceleration after 6 seconds = 202 m/s^2	3	
	Integration constant value = 0.67	3	
	Displacement after 6 seconds = 564.67 m	3	
Q5b	Time of crossing = 2 seconds.	5	
	Distance of crossing from ground = 10.38 m	4	
Q5c	i) velocity at start = 18 m/s	3	
	acceleration at start = 6 m/s^2	2	
	ii) The time when particle reaches maximum velocity = 0.5seconds	2	
	iii) Maximum velocity of particle. = 22.5 m/s	2	
Q6a	Free body diagram showing all active and reactive forces	2	
	Acceleration = 0.426 m/s^2	4	
	Velocity = 2.08 m/s	3	
Q6b	Free body diagram showing all active and reactive forces	2	
		2	
	Formula for work energy principle	5	
	Velocity = 10.47 m/s		
Q6c	Free body diagram showing all active and reactive forces	2	
		2	
	Formula for work energy principle	5	
	Distance = 31.41 m		