



**UNIVERSITI KUALA LUMPUR
MALAYSIA ITALY DESIGN INSTITUTE**

**FINAL EXAMINATION
MARCH 2026 SEMESTER**

COURSE CODE	: PPD 20403
COURSE NAME	: ENGINEERING DYNAMICS
PROGRAMME NAME	: DIPLOMA
DATE	: 23 JUNE 2026
TIME	: 9.00 AM – 11.30 AM
DURATION	: 2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of ONE (1) section; Section A.
4. Section A consist of five questions. Answer FOUR (4) questions only.
5. Please write your answers on the ANSWER BOOKLET provided.
6. Please CLEARLY write the number of the questions in the ANSWER BOOKLET.
7. Formula sheet has been appended for your reference.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 100 marks)

INSTRUCTION: Answer FOUR (4) questions ONLY.

Please use the answer booklet provided.

Question 1

- (a) The acceleration of a particle moving along a straight line is defined by the function $a = (2t - 1) \text{ m/s}^2$, where t is the time in seconds. At $t = 0$, the particle's position is $s = 1 \text{ m}$, and its velocity is $v = 2 \text{ m/s}$.
- i) Determine the velocity and position of the particle at $t = 6 \text{ s}$.
(5 marks)
- ii) Calculate the total distance traveled by the particle during the time interval from $t = 0$ to $t = 6 \text{ s}$.
(5 marks)
- (b) The velocity of a car is plotted as shown in Figure 1. Determine the total distance the car moves until it stops at $t = 80 \text{ s}$. Construct the a - t graph.
(15 marks)

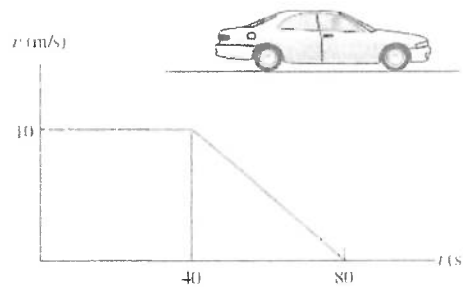


Figure 1

Question 2

- (a) A cyclist starts from rest and travels along a straight path. After covering a distance of 20 m, the cyclist reaches a speed of 30 km/h.
- i) Calculate the cyclist's acceleration, assuming it is constant. (5 marks)
- ii) Determine the total time required to reach the speed of 30 km/h. (5 marks)
- (b) A train starts from rest at Station A and accelerates at a constant rate of 0.5 m/s^2 for 60 seconds. Following this, it maintains a constant velocity for 15 minutes. Finally, it decelerates at a constant rate of 1 m/s^2 until it comes to a complete stop at Station B. Determine the total distance between Station A and Station B. (15 marks)

Question 3

- (a) A girl throws two toys from point A at an angle of 30° above the horizontal, as shown in Figure 2. Determine the required initial speed (v_A) and the resulting time of flight (t_b and t_c) for each throw so that the toys strike the edges of the pool at points B and C simultaneously. (15 marks)

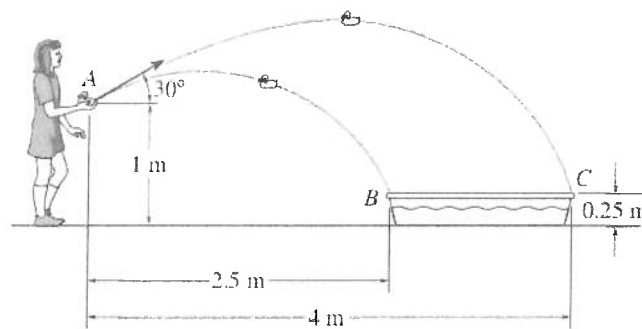


Figure 2

- (b) As shown in Figure 3, a skier leaves a ramp at point A with an initial angle of $\theta_A = 25^\circ$ with the horizontal. If the skier lands on the ground at point B, determine the initial speed v_A and the time of flight t_{AB} .

(10 marks)

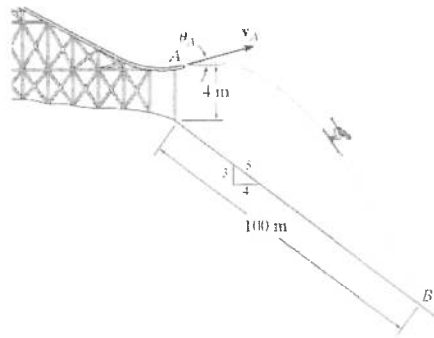


Figure 3

Question 4

- (a) Figure 4 depicts a pulley system where the rope is drawn toward motor M at a constant speed of 10 m/s.

i. Draw the Free-Body Diagram (FBD) for the pulley system.

(5 marks)

ii. Determine the speed of cylinder A.

(7 marks)

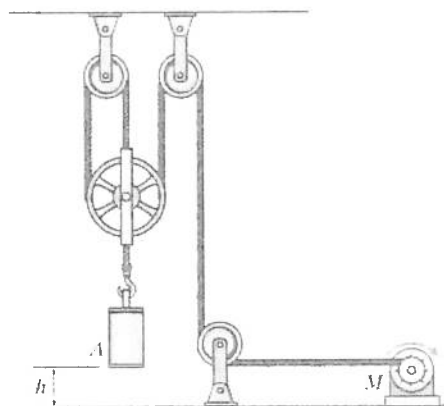


Figure 4

- (b) Determine the speed of block A in Figure 5 if the end of the rope B is pulled downward with a speed of 4 m/s.

(3 marks)

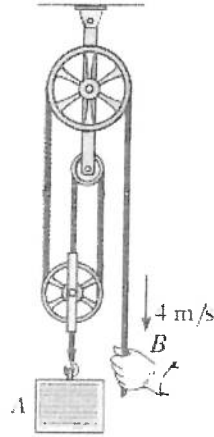


Figure 5

- (c) Figure 6 shows a pulley system with 10 kg block A and 30 kg block B. When the blocks are released, determine their acceleration and the tension of the cable. Neglect the mass of the pulley.

(10 marks)

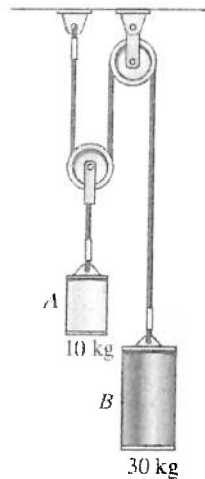


Figure 6

Question 5

- (a) If gear A in Figure 7 rotates with a constant angular acceleration $\alpha_A = 90 \text{ rad/s}^2$ of starting from rest, determine the time required for gear D to attain an angular velocity of 600 rpm. Also, find the number of revolutions of gear D to attain this angular velocity. Gears A, B, C, and D have radii of 15 mm, 50 mm, 25 mm, and 75 mm, respectively.

(12 marks)

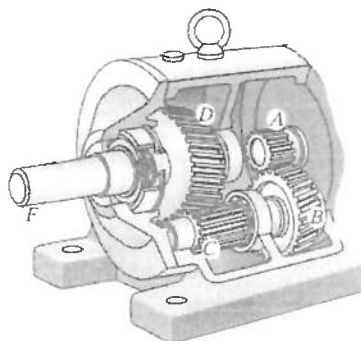


Figure 7

- (b) The driving belt in Figure 8 is twisted so that pulley B rotates in the opposite direction to that of drive wheel A. If the angular displacement of A is $\theta_A = (5t^3 + 10t^2) \text{ rad}$, where t is in seconds, determine the angular velocity and angular acceleration of B when $t = 3 \text{ s}$.

(13 marks)

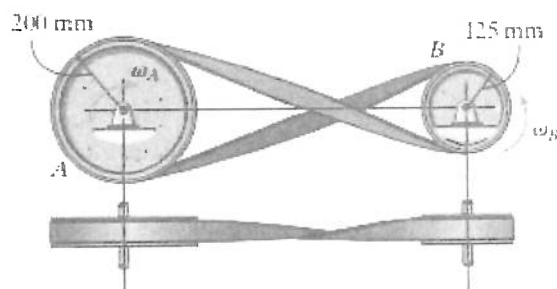


Figure 8

END OF EXAMINATION PAPER

APPENDIX

LIST OF FORMULAE

Linear Motion Equations:		
$v = v_0 + at$	$s = v_0t + 1/2 at^2$	$v^2 = v_0^2 + 2as$
Rotational Motion Equations:		
$\omega = \omega_0 + \alpha t$	$\theta = \omega_0t + 1/2 \alpha t^2$	$\omega^2 = \omega_0^2 + 2\alpha(\theta - \theta_0)$
Relationship Between Linear and Rotational Motion:		
$s = r\theta$	$v_t = r\omega$	$a_t = r\alpha$
$r_A\omega_A = r_B\omega_B$	$r_A\alpha_A = r_B\alpha_B$	$a_n = r\omega^2$
		$a = \sqrt{a_t^2 + a_n^2}$
Moment of Inertia (Solid Disc/Shaft):		
$I = \frac{mr^2}{2}$		
Power:		
$P = \frac{W}{t} = Fv$	$P = T\omega$	
Energy:		
$PE = mgh$	$KE = \frac{mv^2}{2} = \frac{I\omega^2}{2}$	$SE = \frac{kx^2}{2}$
$T_1 + \sum U_1 \rightarrow U_2 = T_2$		
Force & Work:		
$F_f = \mu F_n$	$W = Fs$	$W = T\theta$
Kinematic Relation:		
$v = \frac{ds}{dt}$	$a = \frac{dv}{dt} = v \frac{dv}{ds}$	
Differentiation Rules:		
$\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$		
Integration Rules:		
$\int \frac{d}{dx}(uv) = \int \left(u \frac{dv}{dx} + v \frac{du}{dx} \right)$		
Quadratic Equation Solution:		
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$		