

University of Jordan  
Faculty of Science  
Department of Physics

23  
30

Date : 14/12/2013  
First Semester  
Time: 4:00 – 5:00 pm

General Physics I – PHYS. 0302101  
Second Exam

Name (In Arabic):  
Student Number:



Instructor: د. نور الدين شحيم  
Section: 9

Constants:  $g = 9.8 \text{ m/s}^2$

**\*\* Choose the closest correct answer and fill the Answer Table.**

(Q1) An airplane moves 140 m/s as it travels around a vertical circular loop which has a 1.0-km radius. The magnitude of the resultant force (in kN) on the 70-kg pilot of this plane at the bottom of this loop is:

- (A) 0.70 ; (B) 1.37 ; (C) 2.1 ; (D) 1.3 ; (E) 1.58 ;

(Q2) An object (a) of mass  $m$  flies in a horizontal circle of radius  $R$  at a speed  $v$ . Another object (b) has the same mass  $m$  and flies in a horizontal circle of radius  $R/2$  at a speed of  $v/2$ . Then the ratio of the centripetal acceleration of the object (a) to that of object (b) is:

- (A) 0.25 ; (B) 0.5 ; (C) 1.0 ; (D) 2.0 ; (E) 4.0 ;

(Q3) Single conservative force acting on an object moving along the  $x$  axis is given by  $F_x = (14x - 3x^2) \text{ N}$ , where  $x$  is in  $m$ . The Change in potential energy  $\Delta U$  (in  $J$ ) done by this force as the object moves from  $x = -1 \text{ m}$  to  $x = +2.5 \text{ m}$  is :

- (A) -20.1 ; (B) +38.0 ; (C) -12.0 ; (D) +16.0 ; (E) -28.0 ;

(Q4) A 12-kg block on a horizontal frictionless surface is attached to a light spring (force constant = 800 N/m). The block is initially at rest at its equilibrium position when a force of magnitude 80 N acting parallel to the surface is applied to the block. The speed (in m/s) of the block when it is 13 cm from its equilibrium position is:

- (A) 0.55 ; (B) 0.68 ; (C) 0.78 ; (D) 0.86 ; (E) 0.90 ;

(Q5) A constant force of 15 N in the negative  $y$  direction acts on a particle as it moves from the origin to the point  $(3\hat{i} + 3\hat{j} - 1\hat{k}) \text{ m}$ . The work (in  $J$ ) done by the given force during this displacement is:

- (A) -45 ; (B) -30 ; (C) -60 ; (D) +30 ; (E) +12 ;

(Q6) A 2.5-kg block slides down a plane (inclined at  $40^\circ$  with the horizontal) at a constant speed of 5.0 m/s. The Power (in W) at which the gravitational force doing on the block is:

- (A) zero ; (B) -55.2 ; (C) +78.7 ; (D) +94.5 ; (E) +63.0 ;

(Q7) Three particles are placed in the  $xy$  plane. A 20 g particle is located at  $(3, 4) m$ , a 40 g particle is located at  $(-2, -2) m$ . Where a 20 g particle must be placed (in  $m$ ) so that the center of mass of the three-particle system is at the Origin?

- (A)  $(-0.5, -2.0)$ ; (B)  $(1, 0)$ ; (C)  $(2.5, 2)$ ; (D)  $(-3, -14)$ ; (E)  $(0, -2)$ ;

(Q8) A 3.0-kg object is moving along the  $x$ -axis. Its speed increases from 30 m/s to 40 m/s during a 5.0-s time interval. The magnitude of the average total force (in N) acting on the object during this time interval is:

- (A) 2.0; (B) 3.0; (C) 4.0; (D) 5.0; (E) 6.0;

(Q9) A ball falls to the ground from height  $H$  and bounces to height  $h$ . Momentum is conserved in the ball-earth system

- (A) only if  $h \leq H$ ; (B) only if  $h = 0$ ; (C) only if  $h = H$ ;  
 (D) only if  $h > H$ ; (E) only if  $h \geq H$ ;

(Q10) At  $t = 0$ , a wheel rotating about a fixed axis at a constant angular acceleration has an angular velocity of  $6.0 \text{ rad/s}$ . Two seconds later it has turned through 5.0 complete revolutions. The angular acceleration (in  $\text{rad/s}^2$ ) of this wheel is:

- (A) 15.7; (B) 13.7; (C) 9.7; (D) 7.7; (E) 5.7;

(Q11) A wheel rotating about a fixed axis has an angular position given by  $\theta = 3 - 2t^3$ , where  $\theta$  is measured in radians and  $t$  in seconds. The angular velocity (in  $\text{rad/s}$ ) of the wheel at  $t = 4.0 \text{ s}$  is:

- (A) -24; (B) -38; (C) -54; (D) -62; (E) -96;

(Q12) A disk with a radius of  $2.0 \text{ m}$  whose moment of inertia is  $50 \text{ kg}\cdot\text{m}^2$  rotates uniformly by angular acceleration of  $4.0 \text{ rad/s}^2$ . The net force (in N) acting tangent to the circumference of this disk is:

- (A) 75; (B) 100; (C) 115; (D) 135; (E) 150;

**Answer Table**

**Fill the appropriate square of the correct answer with (X).**

Q's	A	B	C	D	E	Q's	A	B	C	D	E
1		X				7		X			
2				X		8					X
3	X					9			X		
4		X				10		X			
5	X					11					X
6				X		12		X			